Designing and Implementing Injury Surveillance Systems in Indian Country

The *Injury Surveillance Training Manual* is a joint publication of the National Center for Injury Prevention and Control, part of the Centers for Disease Control and Prevention, and the Indian Health Service Injury Prevention Program.

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INJURY SURVEILLANCE TRAINING MANUAL

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PROGRAM AGENDA

DAY 1	DAY 2	DAY 3
CLASS IN SESSION 8:30 – 10:30 Introduction Understand the Concepts and Framework of Injury Prevention	**CLASS IN SESSION 8:30 – 10:30** Develop the Appropriate Methodology for Your Surveillance System (cont.)	**CLASS IN SESSION 8:30 – 10:30** Define and Develop an Analysis Plan: Develop a Plan for Disseminating Results (cont.) Use Surveillance Data to Inform Injury Prevention
Morning Break 10:30 – 10:45	**Morning Break 10:30 – 10:45**	**Morning Break 10:30 – 10:45**
CLASS IN SESSION 10:45 – 12:00 Assess Injury Data Sources and Describe Injury Problem	**CLASS IN SESSION 10:45 – 12:00** Define and Develop an Analysis Plan: Develop a Plan for Disseminating Results	**CLASS IN SESSION 10:45 – 12:00** Define an Evaluation Plan for System and Monitor Prevention Activities
Lunch Break 12:00 – 1:00	**Lunch Break 12:00 – 1:00**	**Lunch Break 12:00 – 1:00**
CLASS IN SESSION 1:00 – 2:30 Build Partnerships or a Coalition to Support the Injury Surveillance System Develop the Appropriate Methodology for Your Surveillance System	**CLASS IN SESSION 1:00 – 2:30** Define and Develop an Analysis Plan: Develop a Plan for Disseminating Results (cont.)	**CLASS IN SESSION 1:00 – 2:30** Exercise: Create a Surveillance System
Afternoon Break 2:30 – 2:45	**Afternoon Break 2:30 – 2:45**	**Afternoon Break 2:30 – 2:45**
CLASS IN SESSION 2:45 – 4:00 Develop the Appropriate Methodology for Your Surveillance System (cont.)	**CLASS IN SESSION 2:45 – 4:00** Define and Develop an Analysis Plan: Develop a Plan for Disseminating Results (cont.)	**CLASS IN SESSION 2:45 – 4:00** Exercise: Create a Surveillance System Evaluation Forms

Agenda is subject to change and times may vary.

CREATING AND IMPLEMENTING INJURY SURVEILLANCE SYSTEMS IN INDIAN COUNTRY

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Course Evaluation

Date:

Location:

Please help us make this course better. Please take the time to fill out this evaluation after each section and at the end of the course. It will assist us in improving the content and delivery of this course. Return this evaluation to your instructor at the end of the course.

A. Course Objectives. Please rate the degree to which the following objectives of this series/lecture were met (1=not at all; 2=minimally; 3=moderately; 4=to a high degree)

Section 1 Objectives

Upon completion of this program, I will be able to:

1. Understand the concepts and classification of injury

1________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

2. Know the difference between unintentional and intentional injury

1________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

3. Describe the burden of injury

1________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

4. Use models for understanding and preventing injury

1________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

5. Know the steps necessary for developing injury surveillance systems

1________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

6. Understand ethical considerations when creating an injury surveillance system

1________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

Section 2 Objectives

7. Identify the injury data sources strengths and weaknesses

1________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

8. Identify the available data sources that can provide information to the surveillance system

1________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

9. Describe the size of the injury problem

1________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

10. Compare the frequency of injury calculated from different data sources

1________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

Section 3 Objectives

11. Identify partners to include in the system and develop recruiting strategies to include them

1________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

12. Identify local, regional and national organizations working on injury prevention in your area

1________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

13. Define the existing social, legal and political framework in which an injury surveillance system and prevention activities may be established.

1________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

Section 4 Objectives

14. Define the injury events and data elements to include in the system

1________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

15. Develop the data collection instrument and determine the data collection frequency

1________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

16. Plan for systemization maintenance and data security

1_________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

17. Define staff and key positions for an injury surveillance system

1_________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

Section 5 Objectives

18. Calculate injury indicators such as frequency, percentages and crude, specific and adjusted rates

1_________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

19. Calculate years of Potential Life Lost

1_________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

20. Describe the geographical analysis of the data

1_________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

21. Define a plan to disseminate and communicate the data

1_________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

Section 6 Objectives

22. Using surveillance data to identify priority injuries in your region

1_________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

23. Use the models that can help identify risk factors and intervention strategies

1__________ 2______ 3______ 4______

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

24. Tie Surveillance to Action and Funding

1 ___ 2 3 4

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

Section 7 Objectives

25. Know the steps to evaluating an injury surveillance system

1 ___ 2 3 4

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

26. Use surveillance data to monitor prevention activities

1 ___ 2 3 4

This objective was covered:

In too little depth_____ In the right amount of depth______ In too much depth_____

28. What additional comments or suggestions do you have?

____

____

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B. Course Design (Circle the number to indicate your level of agreement/disagreement with each of the aspects of course design.)

		Strongly disagree			Strongly agree
1.	The program content has real-world applications for me	1	2	3	4

Comments:____

____

____

2.	The program content met my needs	1	2	3	4

Comments:____

____

____

3.	Length of the course was appropriate	1	2	3	4

Comments:____

____

____

4.	PowerPoint presentation was effective	1	2	3	4

Comments:____

____

____

5.	Course manual was useful	1	2	3	4

Comments:____

____

____

6. In-class activities were effective 1 2 3 4

Comments:____

____

____

7. What did you like most about the course?

Comments:____

____

____

8. What specific things did you like least about the course?

Comments:____

____

____

9. If the course was repeated, what should be left out or changed?

Comments:____

____

____

____

Designing and Implementing Surveillance Systems in Indian Country

Introduction

1

About This Course

- Created by injury prevention specialists working in Indian Country, Indian Health Service and Centers for Disease Control and Prevention
- Created for injury prevention specialists and others working on injury prevention in Indian Country

2

Learning Objectives

- Review the concepts and framework of injury prevention
- Learn to assess injury data sources and describe the injury problem
- Learn how to build partnerships or a coalition to support the injury surveillance system
- Learn how to determine the appropriate methodology for the surveillance system
- Learn how to define and develop an analysis plan for the surveillance data
- Learn to use injury surveillance data to inform injury prevention
- Learn how to define an evaluation plan for the surveillance system and monitor prevention activities

3

What is an Injury Surveillance System?

4

ABOUT THE FINAL EXERCISE

5

Understand the Concepts and Framework of Injury Prevention

Section 1

6

Objectives for Section 1

- Review the concepts, definitions and classification of injuries
- Know the difference between violence-related injury and unintentional injury
- Be able to describe the burden and the cost of injury
- Understand the conceptual models for understanding and preventing injuries
- Know the steps to developing an injury surveillance system
- Understand the ethical considerations associated with surveillance activity

7

Injury Problem in the United States

- Unintentional injuries in 2010
  - 5th leading cause of death
  - Leading cause of death in ages 1-44
  - Cost an estimated $403 Billion annually in medical expenses and lost productivity

8

Injury Problem in Indian Country

- Unintentional injuries in 2010
  - 3rd Leading Cause of Death
  - Leading cause of death in ages 1-44

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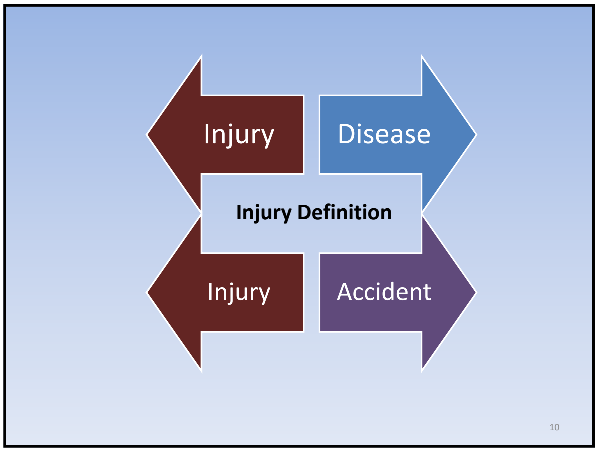

Injury
Disease
Injury Definition
Injury
Accident
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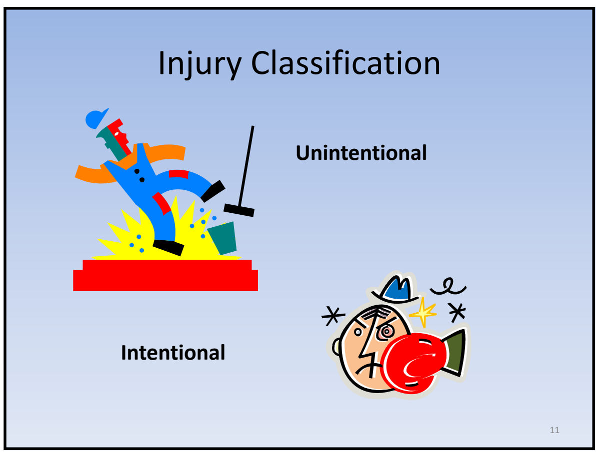
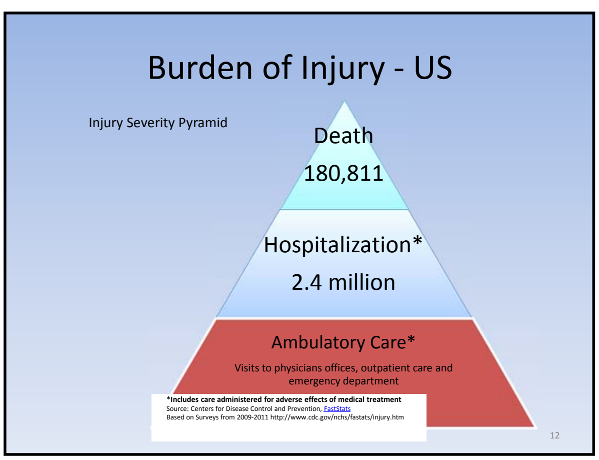


Injury Classification
Unintentional
Intentional
11



Burden of Injury - US
Injury Severity Pyramid
Death
180,811
Hospitalization*
2.4 million
Ambulatory Care*
Visits to physicians offices, outpatient care and emergency department
*Includes care administered for adverse effects of medical treatment
Source: Centers for Disease Control and Prevention, FastStats
Based on Surveys from 2009-2011 http://www.cdc.gov/nchs/fastats/injury.htm
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The Burden of Injury in Indian Country

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Financial Benefits of Injury Prevention

Interventions that Save Money in Indian Country

- DUI Laws
- Personal Flotation Devices
- Smoke Detectors
- Gun Locks
- Bike Helmets
- Primary Seat Belt Laws
- Street Lights & Guard Rails
- Livestock Control
- Child Car Seat Program

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Financial Benefits of Injury Prevention

Intervention	Cost per Unit	Cost Savings
Sobriety Checkpoints	$12,000 per checkpoint	$82,000 per checkpoint
Battery-Operated Smoke Alarms	$44 per alarm	$770 per alarm
Poison Control Centers	$43 per call	$320 per call
Bicycle Helmets for ages 3-14	$12 per helmet	$580 per helmet
Child Safety Seat Distribution, Ages 0-4	$52 per seat	$2,200 per seat

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Conceptual Models for Understanding and Preventing Injury

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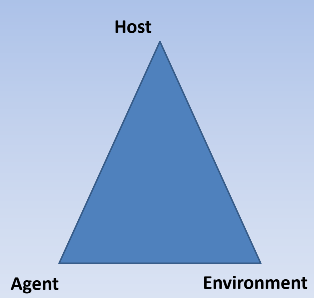
EPI Triad



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Conceptual Models for Understanding and Preventing Injury

Epidemiological Triad and the Haddon Matrix

The Haddon Matrix

		Factors			
		Host	Agent	Physical Environment	Social Environment
Phase	Pre-Event				
	Event				
	Post-Event				

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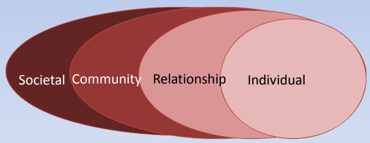
Conceptual Models for Understanding and Preventing Injury

Ecological Model for Understanding Violence



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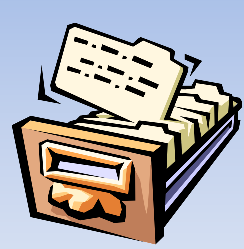
Ethical & Cultural Considerations

- Privacy
- Confidentiality
- HIPAA
- IRB
- Cultural Concerns



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Summary of Section 1

- ✓ Understand the concepts, definitions and classification of injuries
- ✓ Know the difference between violence-related injury and unintentional injury
- ✓ Be able to describe the burden and the cost of injury
- ✓ Understand the conceptual models for understanding and preventing injuries
- ✓ Know the steps to developing an injury surveillance system
- ✓ Understand the ethical considerations associated with surveillance activity

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Assess Injury Data Sources and Describe Injury Problem

Section 2

23

Objectives for Section 2

- Identify injury data sources and the strengths and weaknesses of each
- Identify available data sources that can provide information to your surveillance system
- Describe the size of the injury problem

24

Overview of Common Data Sources

- Death Certificates
- Hospitalization Records
- Outpatient Visits Records
- Police Reports
- Records of Occupational Injuries
- National Data Sources
- WISQARS
- Local Newspaper Accounts

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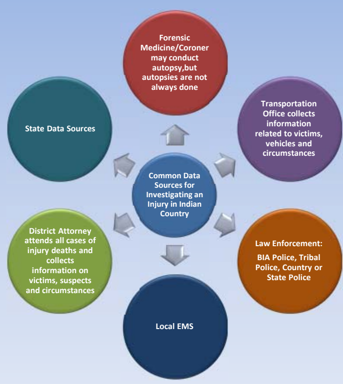

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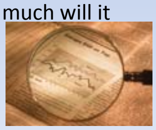
Determining the Strength and Weaknesses of Each Data Source

- Its usefulness for injury surveillance, research and practices.
- Estimates of its accuracy, completeness and representativeness
- Timeliness of the data
- Resource requirements. (How long will it take you to collect the data? How much will it cost?)
- Simplicity



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DATA ASSESSMENT EXERCISE

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Determining the Strengths and Weaknesses of Each Data Source

Jurisdiction

Who collected the data and why?

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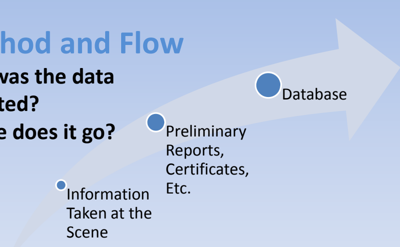
Determining the Strengths and Weaknesses of Each Data Source

Method and Flow

How was the data collected?
Where does it go?



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Identify Data Sources to Include in the System

- Depend on Injury You're Tracking
- Quality
- Use Existing Sources

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Linkage with Other Data Sources

Advantages

- It offers supplemental data
- You might obtain more comprehensive descriptions of an injury event
- Highlights the completeness of data available from each source
- It may improve data quality

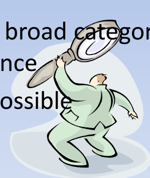
Disadvantages

- May be personal identifiers
- Interagency politics
- Different storage media may create technological problems
- Data quality may not be better

32

Preliminary Data Analysis

- Develop a strategy to ensure cases are not counted more than once
- Start with the analysis of a broad category, such as interpersonal violence
- Then go more in depth if possible



33

Using Data to Define the Injury Problem

- Determining the Frequency of the Leading Causes of Death
- Determine the Frequency of Injury Deaths

34

Why Determine the Leading Cause of Injury Deaths

- Monitor trends
- Identify high risk groups or communities
- Make comparison among groups.
- Motivate stakeholders to support injury prevention
- Help in building a coalition

35

Compare Frequency with Data from Different Sources

- You may find discrepancies
- Identify the mission/goal of the institution collecting the data
- Compare it with the goal of the surveillance system

36

Summary of Section 2

- ✓ Identify injury data sources and the strengths and weaknesses of each
- ✓ Identify available data sources that can provide information to your surveillance system
- ✓ Describe the size of the injury problem

37

Build Partnerships or Coalition to Support the Injury Surveillance System, Data Collection and Prevention Activities

Section 3

38

Section 3 Objectives

- Identify partners to include in the system
- Identify local, regional and national organizations working on injury prevention in your area
- Define the existing social, legal and political framework in which an injury surveillance system and prevention activities may be established.

39

Considerations if You Are Forming a Coalition

- Commitment of lead agency
- Effective core planning group
- Planned recruitment of coalition members
- Coalition structure
- Staff roles
- Mission and goals
- Leadership
- Education of coalition members
- Ownership and commitment of coalition members
- Successful implementation of pilot project
- Recognition for members

40

Identify Partners to Include in Coalition

- The different roles that might be necessary to the success of your surveillance system
- Who might have access to the different data sources you need
- What support do you need and which organizations can provide that support
- Whose objectives overlap with yours
- What role will the organization members fulfill
- What kind of data do they collect
- Why do they collect data
- Can you share or link data
- What are their sources of data

41

Identify State and Local Organizations Working in Injury Prevention

- Health care providers
- Police Departments
- Fire Departments
- Schools
- Social Service Agencies
- Employers
- Government Agencies
- Local IP Coalition
- County IP Coalition
- State Death Review Team
- Trauma Registry

42

Determine the Existing Social, Legal, and Political Framework

43

Summary of Section 3

- ✓ Identify partners to include in the system and develop a strategy to involve them
- ✓ Identify local, regional and national organizations working on injury prevention in your area
- ✓ Define the existing social, legal and political framework in which an injury surveillance system and prevention activities may be established.

44

Determine the Appropriate Methodology for Your Surveillance System

Section 4

45

Section 4 Objectives

- Define the injury events and data elements to include in the system
- Develop the data collection instrument and determine data collection frequency
- Plan for systemization, maintenance and data security
- Define the functions and skill sets for key positions in your surveillance system

46

Considerations When Developing Methodology

- What do you want the system to do?
- The size and type of the injury problem
- Availability of data sources
- Access to information
- Political priorities
- Potential for intervention
- Sustainability

47

Considerations When Developing Methodology

Keep the data collection plan in mind

- Identify your topic
- Narrow your focus
- Identify a specific question
- Anticipate data needs
- Develop and pre-test your data collection instrument

48

Defining Injury Events

What are Your Objectives

- Identifying emerging hazards
- Describing injury patterns to justify the need for intervention
- Assessing the impact of a prevention program
- Determining the health care costs associated with injury

49

Defining Injury Events

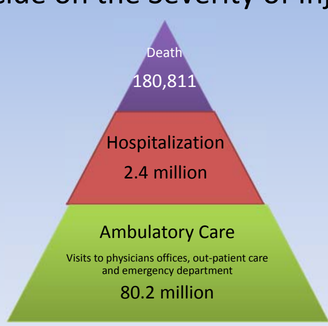
Case Definition

- Needs to be clearly stated and easily understood
- Use comparable definitions as those used elsewhere
- Contain a clear statement of the following
  - Person: race, Tribe, age, gender
  - Place: state, reservation, roadway
  - Time: year, time of day, day of week, specific dates (4th of July), weekends
  - Intentionality: intentional/unintentional
  - Age grouping
  - Severity

50

Defining Injury Event

Decide on the Severity of Injury



51

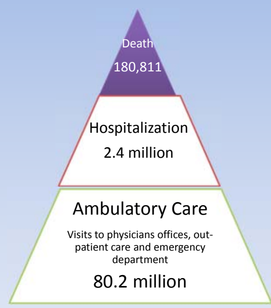
Defining Injury Event

Decide on the Severity of Injury

Deaths

Advantages
- Data is readily accessible from death certificates which are tracked by the state and kept in a central database
- Cause of death is consistently reported on death certificates
- Race or ethnicity information is usually available

Disadvantages
- Rare event. Injury deaths represent less than 1% of injury events
- Not a good guide to ascertaining overall injury problem or medical consequences, such as long term disability
- Influenced by small numbers, especially in small populations or over a short period of time



52

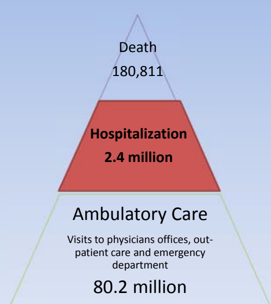
Defining Injury Event

Decide on the Severity of Injury

Hospitalization

Advantages
- When combined with mortality data it offers a better picture of overall problem
- Disability and healthcare costs can be better described

Disadvantages
- Access to data is more difficult
- Privacy is more of a consideration
- Records may be manual
- Inconsistent, incomplete or incorrect coding of injury causation
- Race or ethnicity information is sometimes available



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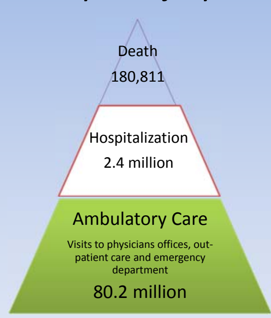
Defining Injury Event

Decide on the Severity of Injury

ED Visits

Advantages
- When combined with other data, helps provide the big picture
- You may benefit from casting the net wider
- Can be useful for specialized studies

Disadvantages
- Large number of cases may be difficult to handle
- Access to data may be difficult
- Records may be manual
- Inconsistent, incomplete or incorrect coding of injury causation
- Race or ethnicity information is not readily available from non-local sources



54

Defining Injury Event

Decide on the Severity of Injury

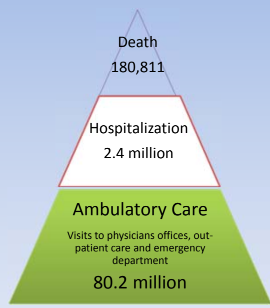
Out-Patient Visits

Advantages

- May be a primary source of injury data if there is no hospital
- May be good for specialized injuries, such as sports related injuries or eye injuries
- Might be good supplemental information

Disadvantages

- Difficult access
- Privacy issues (data is highly protected by practitioners)
- Race or ethnicity information is not readily available



55

EXERCISE CASE DEFINITION

56

Defining an Injury Event

Using ICD-Codes

Advantages

- Ability to identify trends
- Ability to describe the specific causes and contributing factors
- Standardization of descriptions that can aid in sharing data or linking databases
- As of October 1, 2014 all Indian Health Service/Tribal/Urban programs must use ICD-10 codes on all HIPAA electronic record transactions.

Disadvantages

- Not all records are coded
- Records are miscoded or inconsistently coded
- Poor chart information results in non-specific code
- Don't always provide the desired specificity
- You must stay apprised of updates
- Previously not required for billing, so seen by some coders as unnecessary

57

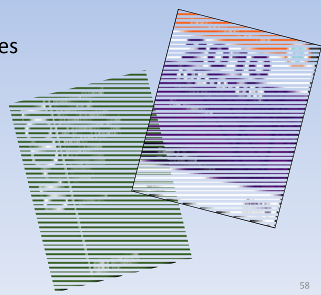
Defining an Injury Event

Using ICD-Codes

A Quick Review from Level 2

- Diagnosis Codes
- Cause of Injury Codes

- ICD-9 (Non-fatal)
- ICD-10 (Deaths)



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Anatomy of an E-Code

E XXX . Y

Injury Category

Specificity

59

Anatomy of an ICD-10 Code

X X X . XXX X

Injury Category

Specificity: Cause, Anatomic Site, Severity

Encounter

60

Defining an Injury Event

Using ICD-Codes

ICD-9

- Morbidity
- Required for Billing
- Numeric
- 800-999
- Updated > annually
- Phase out: 2014

ICD-10

- Mortality
- Alphanumeric
- S00-T98
- Updated every October
- 10/1/2014 Morbidity

61

Defining an Injury Event

Using ICD-Codes

ICD-9

Fractures	800-829
Open Wound	870-897
Crushing	925-929
Burns	940-949
Poisoning	960-979

fx vault of skull; closed; no intercranial injury less than 1 hr LOC	800.02

ICD-10

Injury to…	
Head	S00-S09
Neck	S10-S19
Knee/Lower Leg	S80-S89
Mult. Body Parts	T00-T07
Burns & Corrosn	T20-T32
Frostbite	T33-T35
Poisoning	T36-T50

See Reference Handout 62

External Cause of Injury Coding References

- American Academy of Professional Coders http://www.aapc.com/
- World Health Organization http://www.who.int/classifications/icd/en/
- CDC National Center for Health Statistics http://www.cdc.gov/nchs/icd.htm
- CDC article on improving E-coding http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5701a1.htm

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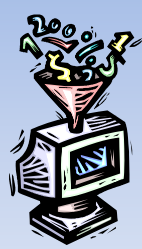
EXERCISE
READING AN E-CODE

64

Determine the Variables in Your System



- Name
- Age and sex
- Marital Status
- Education Level
- Employment Level
- BAC - *Nice to have, but rarely available*
- Occupant Protection for Transportation
- Time
- Place
- Circumstances surround the injury event

65

Data Collection Instrument and Data Collection Frequency

Designing a Form

- Define what you want in your system first
- Keep it simple
- Only include the data you need
- Make sure it is well-designed and easy to read
- Decide whether or not to pre-code the form

66

It's Very Important to Pretest Your Form

67

Data Collection Instrument and Data Collection Frequency

Collecting Data

- Frequency of Data Collection
- Active vs. Passive Data

68

Data Collection Instrument and Data Collection Frequency

Data Collection Planning Summary

- Decide what you want out of your system
- Identify your case definition
- Define your variables
- Develop your form
- Consider how HIPAA/Privacy issues may impact your collection efforts
- Test your form

69

EXERCISE
COMPARING FORMS

70

Determining the Type of Surveillance System

- Universal surveillance
- Surveillance based on samples of cases
- Surveillance based on a review of institutional registries
- Survey-based surveillance
- Sentinel surveillance

71

Setting Up an Electronic Database

- Seek the assistance of a programmer, epidemiologist or statistician
- Epi Info 2002
  - Free software available through CDC
  - http://wwwn.cdc.gov/epiinfo/7/index.htm
- Make sure all paper records with identifiers are locked away

72

Systemization & Maintenance

- Reducing errors that may be introduced through flaws in the design.
- Improving the system's scope and services through routine maintenance, emergency maintenance and requests for special reports.
- Safeguarding the system

73

Systemization and Maintenance

Improving the System's Scope

- Backing up data and system files according to an established schedule.
- Maintaining records in a secure environment
- Requiring requests for emergency maintenance to be in writing and entered into a log
- Assigning priorities for special requests on the basis of urgency of need and time and resources required for fulfillment
- Institutionalizing routine maintenance
- Documenting maintenance that is conducted

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Systemization and Maintenance

Ways of Safeguarding Your System

- Limit access to one person
- Install the database on two computers.
- Keep a second copy of the database off site.

75

Systemization and Maintenance

Threats to a Database

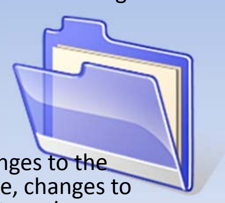
- Human error
- Mechanical failure
- Malicious damage
- Cyber crime
- Invasion of privacy
- Computer viruses

76

Systemization and Maintenance

Protocol

- The procedures for obtaining and securing data
- Maintenance procedures
- Rules for data storage
- Rules for password creation
  and protection
- Documents that detail all changes to the system, including maintenance, changes to the data collection instruments and case definitions, etc.



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EXERCISE
COMPARING PROTOCOL

78

Define Staff

- Coordinate system activities
- Establish contact with data sources and stakeholders
- Data entry
- Quality control
- Analysis
- Preparation of reports

79

Advisory Board

- Obtaining the data necessary for the injury surveillance system
- Review and advise on policy and procedures
- Identifying the best use of data
- Strategizing about how to remove obstacles and inefficiencies
- Providing speaking opportunities with professional organizations
- Obtaining data sharing agreements
- Showing broad, high-level support for the system
- Getting local approval for a surveillance system
- Navigating Tribal politics or resistance to surveillance, data collection or data sharing

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Summary of Section 4

✓ Define the injury events and data elements to include in the system

✓ Develop the data collection instrument and determine data collection frequency

✓ Plan for systemization, maintenance and data security

✓ Define the functions and skill sets for key positions in your surveillance system

81

Define and Develop an Analysis Plan; Develop a Plan for Disseminating Results

Section 5

82

Section 5 Objectives

- Calculate injury indicators such as frequency, percentages and crude, specific and adjusted rates
- Calculate Years of Potential Life Lost
- Describe the geographical analysis of the data
- Define a plan to disseminate and communicate the data

83

Data Analysis & Interpretation

Epidemiological Concepts and Terms

- Epidemiology
- Population-based
- Injuries are not random
- Morbidity v. Mortality
- Risk
- Endemic vs. Epidemic

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Data Analysis & Interpretation

Epidemiological Concepts and Terms

Epidemiology

"The study of the distribution and determinants of health-related states or events in specified populations and the application of this study to control health problems." *A Dictionary of Epidemiology*

- Who
- Where
- When
- What
- Why
- How

85

Data Analysis & Interpretation

Epidemiological Concepts and Terms

Epidemiology is POPULATION-BASED (concerned with the community, not the individual)

86

Data Analysis & Interpretation

Epidemiological Concepts and Terms

Risk:

"The probability that an event will occur."

A Dictionary of Epidemiology

87

Data Analysis & Interpretation

Epidemiological Concepts and Terms

Risk Factor:

"An attribute or exposure that could increase the probability of a specific outcome."

"A determinant can sometimes be modified by an intervention, thereby reducing the probability of occurrence of … specified outcome."

A Dictionary of Epidemiology

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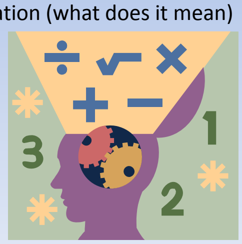
Data Analysis & Interpretation

Analysis – General Concepts

- Analysis involves:
  - Basic statistics (the counting)
  - Interpretation (what does it mean)



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Data Analysis & Interpretation

Analysis – General Concepts

- To analyze:
  - Separate into elements or constituent parts
  - Separate the parts of the whole so as to reveal their relation to it and to one another
  - Examine critically or methodically
- No set formula, rule or methodology … analysis is as much an art as it is a science
- Look for patterns, clusters, the unusual, unexpected
- Progress to more complex analysis as necessary

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Data Analysis & Interpretation

Analysis – General Concepts

Basic Rules to Consider

- Indicate the “N” (number of data items in the data set or “n” (number of data items in the data subset)
- Small numbers ≠ “bad results” … just qualify or acknowledge the “N” upfront.

91

Data Analysis & Interpretation

Analysis – General Concepts

Two Common Misconceptions to Avoid

- A computer does not think for you. It does the counting; you have to interpret the numbers.
- Correlation does not necessarily imply causation

92

Data Analysis and Interpretation

Basic Statistics

- Numeric Value
- Midpoint (measure of central tendencies)
- Proportions

93

Data Analysis and Interpretation

Basic Statistics

Numeric Value

- Very common
- Easy to understand
- Cannot be compared
- Does not indicate risk

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Data Analysis and Interpretation

Basic Statistics

Midpoint (measure of central tendencies)

- Mode
- Median
- Mean (average)

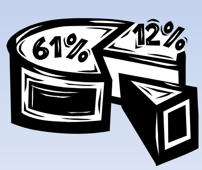
95

Data Analysis and Interpretation

Basic Statistics

Proportional Distribution

- Commonly used
- Simple calculation
- Sum of all values = 100%
- Can be misleading
- Not a measure of risk



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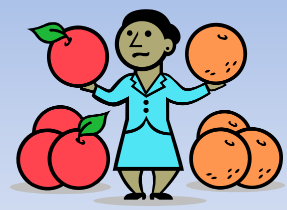
Data Analysis and Interpretation

Basic Statistics - Rates



"… comparing apples to oranges …"

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Data Analysis and Interpretation

Basic Statistics - Rates

Rate:

"An expression of the frequency with which an event occurs in a defined population over a specific period and converted to a whole number by multiplying by some power of 10 (usually 10,000 or 100,000)."

A Dictionary of Epidemiology

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Data Analysis and Interpretation

Basic Statistics - Rates

	Rate
Community A	150 per 100,000
Community B	100 per 100,000
Community C	500 per 100,000

99

Types of Rates

- Incidence Rate
- Prevalence Rate
- Specific Rate

100

Data Analysis and Interpretation

Basic Statistics - Rates

Rate per 100,000

$$\frac{Number\ of\ cases}{Population\ at\ risk} X\ 10^{n}\ or\ (K)$$

(same exposure period)

101

Data Analysis and Interpretation

Basic Statistics - Rates

Combine population when calculating a rate for a multi-year period.

Example

Injury Death Rate for a community from 2008-2010

Cases in 2008 + Cases in 2009 + Cases in 2010

Divided by

Population in 2008 + Population in 2009 + Population in 2010

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Data Analysis and Interpretation

Basic Statistics - Rates

Rate

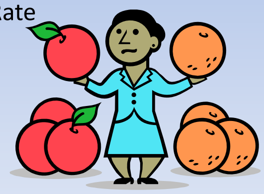
$$\frac{17\ cases}{13{,}000\ Population}\ X\ 100{,}000\ Standard\ Pop. = 131\ per\ 100{,}000\ pop.$$
same time period

103

Data Analysis and Interpretation

Basic Statistics - Rates

- Crude Rate
- Specific Rate
- Adjusted Rate



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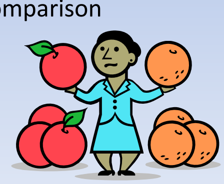
Data Analysis and Interpretation

Basic Statistics - Rates

Some general considerations

- Accurate Numerator
- Estimated Denominator
- Used Primarily for Comparison
- Indicator of risk



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RATE CALCULATION EXERCISE

106

Data Analysis and Interpretation

Years of Potential Life Lost

YPLL = Years of Potential Life Lost

- Measure of Premature Death
- YPLL = 65 – age at death

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Data Analysis and Interpretation

Geographic Analysis of Data

Depicts data using maps

- Spot Map - produced by placing a dot or other symbol on the map where an injury occurred
- Area or Choropleth Map - regions are shaded or marked proportionally to the data being depicted
- Pin or Cluster Map is a way of indicating road traffic hazards or crash prone locations along roads

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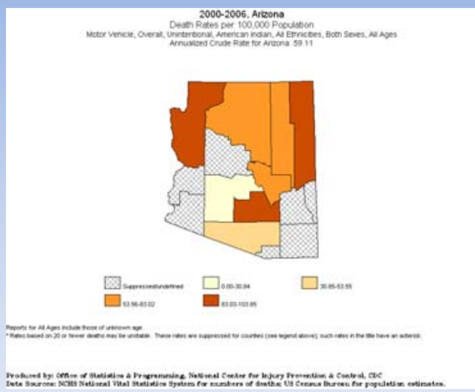

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Data Analysis and Interpretation

Summary

- Epidemiology serves as a foundation
- Many data analysis methods
- Importance of rates
- Need to interpret results and explain what they mean
- Utilize available resources
- Communicate your findings

110

Communicate Results

Surveillance can only achieve results if the information is communicated to the appropriate people.

111

Communicate Results

Steps to Take

- Determine who will get the information
- Check with each tribe within your surveillance system
- Develop the message
- Select the format
- Market the message
- Evaluate the impact

112

Surveillance System Report

- A means to convey the results of the surveillance system to all the stakeholders
- Consider the needs to the stakeholders when making decisions about design and frequency

113

Surveillance System Report

Considerations for inclusion

- Introduction
- Leading causes of death: frequency, proportions, and crude rates
- Leading causes of injury deaths: frequency, proportions and crude rates
- Leading causes of morbidity if available
- YPLL
- Cost of injuries
- Priority injuries
- Recommendations for intervention

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Surveillance System Report

Recipients

- Stakeholders, decision makers, law enforcement, public health directors, school officials, etc.
- Hospital, emergency departments, health clinics
- Health professionals in the scientific community
- Scientific/academic researchers
- Grassroots organizations

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Surveillance System Reports

Delivery method

- Health department newsletters
- PSAs
- Press releases
- Flyers
- Periodicals/annual reports
- Presentations
- Newspapers
- Websites

116

Summary of Section 5

- ✓ Calculate injury indicators such as frequency, percentages and crude, specific and adjusted rates
- ✓ Calculate Years of Potential Life Lost
- ✓ Describe the geographical analysis of the data
- ✓ Define a plan to disseminate and communicate the data

117

Use of Surveillance Data to Inform Injury Prevention

Section 6

118

Objectives for Section 6

- Understand the use of surveillance data to identify priority injuries.
- Understand models that help identify risk factors and intervention strategies for priority injuries.
- Understand the models for identifying the most appropriate interventions for the injuries in your Tribe or community.
- Understand how to tie surveillance to action and funding.

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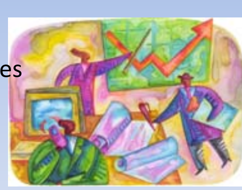
Use of Surveillance Data

- Establish injury priorities
- Show severity of injuries
- Show magnitude of injuries
- Provide perspective
- Track trend of injuries over time
- Inform local, regional and national authorities



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Criteria to Prioritize Injury Events

Event Importance

- Magnitude
- Trend
- Severity
- Cost

121

Criteria to Prioritize Injury Events

Prevention Control Capacity

- Possibility for controlling the event
- Interest among local and regional groups for controlling the event

122

Criteria to Prioritize Injury Events

High Importance + Good Control and Prevention Capacity = High Priority for Prevention and Control

123

Criteria to Prioritize Injury Events

High Importance + Low Control and Prevention Capacity = High Priority for Research

124

Criteria to Prioritize Injury Events

Low Importance + Good Control and Prevention Capacity = Low Priority for Prevention and Control

125

Criteria to Prioritize Injury Events

Low Importance + Low Control and Prevention Capacity = Not a Priority

126

Criteria to Prioritize an Injury Event

Information that Will Help in Setting Priorities

General Information

- Leading causes of death
- Number, proportion, and crude and adjusted rates
- YPLL from injuries by intention
- Trend of injuries over a minimum of five years

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Criteria to Prioritize an Injury Event

Information that Will Help in Setting Priorities

Specific Information

- Homicide: crude and specific rates by age group and sex and mechanism
- Motor vehicle related deaths: crude and specific rates by age group, sex and road user (pedestrian, vehicle occupant, motorcyclist or cyclist)
- Leading causes of injury morbidity: crude rates by age group, sex and nature of injury, lethality rate, admission rate and disability
- Information on activities to control injuries at local, regional and national levels.

128

Criteria to Prioritize an Injury Event

Information that Will Help in Setting Priorities

- Costs
- Disability Adjusted Life Years
- Information on Activities to Control Injuries
- Control Possibilities or Vulnerabilities

129

Identifying Potential Interventions & Strategies to Prevent Priority Injuries

- The Haddon Matrix
- The Ecological Model for Violence-Related Injuries
- Decision Matrix

130

Use the Haddon Matrix to Identify Possible Interventions for Unintentional Injuries

Haddon Matrix to Identify Strategies to Prevent Childhood Injuries Caused by Dog Bites

	Host (Human)	Agent (Dog)	Physical Environment	Social Environment
Pre-Event	Teach kids about dogs: Don't go near a dog's food, unknown dogs, dogs in yards, mother dog with new puppies, etc. Teach children, parents, and caregivers how to respond in case of aggression	Teach dogs appropriate and acceptable behavior (socialization training) Spay and neuter dogs	Maintain dogs in fenced yards or enclosures or by electronic "invisible" means Use gate alarms to indicate when gate is opened	Increase community awareness of the problem and solutions Pass leash laws Pass of dangerous dog laws/ordinances (e.g., requiring impoundment, evaluation, and destruction, if necessary) Initiate and support animal control programs (i.e., evaluate reports of dangerous dogs and pick up strays/unleashed dogs) Establish spay/neuter and vaccination programs
Event	Don't run from dogs Stand still and yell for help Position bike, bag, or other obstacle between you and the dog. If knocked to the ground, protect head, neck and face	Identify risk situations before biting occurs (e.g., watch for signs of aggression like growling, hair raised, etc.) Muzzle dangerous dogs	Respond to alarm system sounding indicating gate is opened or dog has escaped	Apply consequences of dangerous dog laws/ordinances Enforce laws requiring impoundment of dangerous dogs
Post-Event	Provide first aid/trauma care and rabies vaccine if appropriate Provide psychological support if it is necessary	Evaluate dangerous dogs and destroy them if appropriate Impound dogs; observe for rabies	Use emergency medical service (EMS) systems, medical care system, and rehabilitation programs	Maintain community surveillance for dog bites Report dog bite incidents Repeat dog bite prevention messages

131

Use the Ecological Model to Organize Possible Interventions to Prevent Violence-Related Injuries

Example:

During the course of a person's life, behavior patterns may change – including those associated with violence. Adolescence and young adulthood are periods when violence and other types of risky behaviors are often more expressive. Understanding these conditions and behaviors can help to identify appropriate interventions and policies. In the following example, the Ecological Model has been used to identify strategies for preventing youth violence.[5]

Table 8. Potential Interventions to Prevent Youth Violence[5]

Level	Potential Interventions
Individual	Programs to increase access to prenatal and postnatal care Preschool enrichment programs Perpetrator programs Victim care and support Building of social skills
Relationship	Home visitation Skill training programs on parenting Supportive relationship with a positive adult role model Home-school partnership programs to promote parental involvement Peer mediation of students helping other students resolve disputes
Community	Extracurricular activities Gang prevention programs Reducing the availability of alcohol
Society	Reducing income inequality Reducing media violence Having laws prohibiting illegal transfers of guns to adolescents Reforming educational system Strengthening and improving police and judicial systems

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Use the Decision Matrix to Identify the most appropriate intervention for the Injuries in your region

The Intervention Decision Matrix is a tool designed to help people identify and choose among intervention options. This matrix can also help identify long-term goals and intervention options, which must be considered together. This tool is applied after the priority injury problems have been identified. The original Decision Matrix has seven elements. For the purposes of this manual, the matrix has been adapted to include five elements, to make it more workable. The elements are:

1. Effectiveness,
2. Cost,
3. Sustainability,
4. Social and political acceptability,
5. Possible unintended consequences.

The scoring ranges from 1 for low, 2 for medium, and 3 for high. However, for some elements, the score must be applied in reverse order. Finally, the scores are summed. The strategy with the highest score should be the most viable.

Decision Matrix — Elements and Score

Elements	Score		
1. Effectiveness	1. Not proven effective	2. Moderately effective	3. Highly effective
2. Cost	1. High cost	2. Medium cost	3. Low cost
3. Sustainability	1. Low sustainability	2. Medium sustainability	3. High sustainability
4. Social and political acceptability	1. Low acceptability	2. Medium acceptability	3. High acceptability
5. Possible unintended consequences	1. Known consequences	2. Unknown or unclear whether there are consequences	3. No consequences

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Tie Surveillance to Action and Funding

- Injury Prevention
- Policy Change
- Improved Data Collection
- Funding to Support Prevention Efforts

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DISCUSSION

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Summary of Section 6

- ✓ Understand the use of surveillance data to identify priority injuries.
- ✓ Understand models that help identify risk factors and intervention strategies for priority injuries.
- ✓ Understand the models for identifying the most appropriate interventions for the injuries in your Tribe or community.
- ✓ Understand how to tie surveillance to action and funding.

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Define an Evaluation Plan for your Surveillance System and Monitor Prevention Activities

Section 7

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Section 7 Objectives

- Know the steps to evaluating the system.
- Be able to use surveillance to monitor prevention activities

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Evaluation Process

- Engage stakeholders in the evaluation
- Describe the surveillance system to be evaluated
- Determine a process for evaluation
- Use surveillance data to monitor prevention activities

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Factors to Consider When Evaluating Your System

- Simplicity
- Flexibility
- Data Quality
- Acceptability
- Timeliness
- Stability
- Sensitivity
- Representativeness

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Important Steps

- Communicate your findings to the appropriate people
- Keep notes about any changes you make to the system

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Use Surveillance Data to Monitor Prevention Activities

- Monitor changes that occur after the prevention effort is implemented – look at the number of injuries, the rate of injuries or the severity
- Monitor changes in the trend of an event before and after a strategy is applied
- Monitor the impact of strategies applied for purposes other than injury prevention that could impact the results
- Possible over or under representation of certain groups in the population
- Possible over or under representation of some types of events in the region

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Summary of Section 7

✓ Know the steps to evaluating the system.

✓ Be able to use surveillance to monitor prevention activities

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FINAL EXERCISE: CREATE A SURVEILLANCE SYSTEM

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Introduction

Welcome to Designing and Implementing Injury Surveillance Systems in Indian Country. This course is the culmination of many months of discussion and collaboration among injury prevention specialists working in Indian Country, the Indian Health Service and the Centers for Disease Control and Prevention. This course is designed for tribal injury prevention specialist, environmental health officers, and others who are working on injury prevention in Indian Country.

Over the next three days, you will learn the steps to creating an injury surveillance system, beginning with a review of some of the concepts you learned in IHS Level 2 Injury Prevention Training. followed by a discussion of the six steps to creating a surveillance system.

By the end of this course you should be able to:

1. Understand the conceptual framework of injury prevention;
2. Assess injury data sources and describe the injury problem;
3. Build a coalition to support the injury surveillance system;
4. Determine the appropriate methodology for the surveillance systems;
5. Define and develop an analysis plan for the surveillance data;
6. Use injury surveillance data to inform injury prevention;
7. Define an evaluation plan for the surveillance system and monitor prevention activities.

Let’s start by asking:

What is an Injury Surveillance System?

One definition is provided below.

… the ongoing systematic collection, analysis, and interpretation of injury data, for use in planning, implementation and evaluation of prevention activities. Injury prevention programs use surveillance data to assess the need for new policies or programs and to evaluate the effectiveness of those that already exist.”

Safe States Working Group. SAFE STATES: Five Components of a Model State Injury Prevention Program and Three Phases of Program Development.

There are many ways of creating a surveillance system. Not everyone will be able to implement every step as it is outlined in this course. **The important thing is to get started. Implement what you can, as best you can and make improvements when you can.**

Notes

Section 1: Understand the Concepts and Models for Injury Prevention

Learning Objectives

- Understand the concepts, definitions and classifications of injuries
- Know the difference between violence related injuries and unintentional injuries
- Describe the burden and cost of injury
- Know the conceptual models for understanding and preventing injuries
- Know the steps to develop an injury surveillance system
- Know the ethical consideration for injury surveillance

Introduction

Injuries, both intentional and unintentional, are a leading cause of death and disability in American Indian and Alaska Native (AI/AN) communities.[1] As a nation, unintentional and intentional injuries cost an estimated $403 billion annually in medical treatment and lost productivity.[2] It is no wonder that injury prevention is a priority in the United States and particularly in Indian Country.

The first step in effectively preventing injuries is to conduct injury surveillance to identify the frequency and types of injuries that are occurring in a community and the risk factors. Injury surveillance can:

- Help determine the cause and costs of injuries in your community
- Focus efforts on those injuries that are most detrimental
- Gain community support and money needed to conduct an effective injury prevention program

This course will guide you through the steps of developing and maintaining an injury surveillance system for your community. In some cases, this course will present an ideal process of how injury surveillance could be conducted, but throughout there is broad recognition that in Indian Country you may not have access to the resources, personnel or data to achieve the ideal. ***The goal is not to create the perfect surveillance system, but to create the best system possible, knowing that it can be expanded or improved upon later.***

In this section, we will review some of the concepts and terms of injury prevention that were covered in the IHS Level II Injury Prevention Course; review the magnitude of the injury problem in Indian Country and the United States; and introduce the steps for developing and maintaining an injury surveillance system. Each of the other steps will be discussed in detail in subsequent sections of this manual.

Injury Definition

An injury is caused by exposure to an outside force, such as mechanical energy, electricity, heat or chemicals. In some cases, injury can be caused by a lack of something essential, such as air, as in drowning, or by exposure to something, such as extreme cold, as in frostbite. About three-fourths of all injuries are caused by the uncontrolled release of mechanical energy. [3]

Injury vs. Disease

Some experts think that an injury is defined by immediate damage to the body from an external force. Some believe that the interval between the exposure and the damage can be relatively long, such as in poisoning from carbon monoxide, alcohol abuse or lead poisoning. The distinction between injury and disease is an important issue to consider when conducting injury surveillance. Table 1 below shows some examples of how exposure to similar elements can result in injury or disease.[4]

Table 1. Injury vs. Disease

Injury	Disease
A construction worker breaks his toe while using a jackhammer on the job	A construction worker is diagnosed with tendonitis of the elbow from years of exposure to the vibration of a jackhammer
A child is bitten by a dog and requires ten stitches to his leg	A child contracts rabies after a dog bite
A person dies in a car crash as the result of drunk driving	A person dies from sclerosis of the liver as the result of years of alcohol abuse
A firefighter suffers smoke inhalation while fighting a wildfire	A former uranium miner contracts lung cancer from years of exposure to uranium dust

In each of the examples above, you would say the first victim suffered from an injury, while the second victim suffered from a disease. Acuteness is a factor. The shorter the time from the exposure to a hazard to the impact on the body, the more likely it is to be classified as an injury rather than a disease. [5]

Injury vs. Accident

Injuries are not the result of accidents. For many people, accidents are something unpredictable or something that happens by chance. But events that injure people have identifiable risk factors which can be modified. Many experts believe that the use of the word “accident” when referring to injury events creates confusion and inhibits prevention efforts. [6]

Injury Classification

Injuries can be broadly classified into two groups – unintentional injuries or violence-related injuries (also called intentional injuries). Unintentional injuries relate to traffic crashes, events in the home or the workplace, in public places or as the result of natural disasters. Intentional injuries are related to interpersonal, collective or self-directed violence.

Unintentional Injuries

Unintentional injuries – such as falls, car crashes, burns or drowning -- occur without the intent of anyone involved. According to information obtained from the Centers for Disease Control WISQARS site, in 2010 unintentional injuries were the fifth leading cause of death for all ages in the United States. In Indian Country, unintentional injuries were the third leading cause of death for all ages and the leading cause of death for people under the age of 44.[7]

An unintentional injury can be described as follows:

- Physical damage to the body
- Damage that results from excessive force to the body; exposure to external agents, such as poison; or deprivation of an essential element such as air or warmth
- The damage is not done deliberately

Unintentional injuries can be inflicted by a number of mechanisms, including:

- Mechanical (impact with a moving or stationary object)
- Radiant (ultraviolet radiation)
- Thermal (air or water that is too hot or too cold)
- Electrical (lightning strike, electrical shock)
- Chemical

Table 2 shows the mechanism of injury for common injuries and the place where the injury occurs most often.

Table 2. Unintentional Injuries

Mechanism of Injury	Place of Occurrence				
	Home	Sports/ Leisure	Work-places	School Facilities	Public Places
Burns/Scalds From electrical appliances, cooking mishaps, cooking stoves with open flame, radiators, home fires,					
Cuts/Lacerations Toys, sports, playgrounds, furniture, household gadgets, gadget blades, occupational hazards					
Drowning At pools and beaches or from floods, falls into ponds and wells, water transport					
Impact Injury Falls from rooftops, windows or furniture. Falls related to agriculture, construction, recreation, sports, or transportation (automobiles, bicycles, pedestrians, motorcycles.)					
Electric Shock From household gadgets, toys, and substandard or hazardous wiring; improper use of and substandard electrical gadgets					
Poisoning From medicines, household chemicals, cooking fuels, seeds					
Suffocation/Asphyxia From infant and toddler furniture, clothes and toys, plastic bags, swallowing of seeds or toys					
Firearms Unintentional use					

Insect and Animal Bites From dogs, snakes, scorpions, etc.					

Adapted from: Mohan D, Romer J. Accident mortality and morbidity in developing countries. In: *The Epidemiological Approach*. New York, NY: Oxford University Press; 1998.

Intentional Injuries

Intentional or violence-related injuries occur because of a person's deliberate intent to harm another or oneself. Intentional injuries can be the result of a number of things, including domestic violence, child or elder abuse or suicide attempts.

The World Health Organization divides violence-related injuries into three broad categories:[8]

- Self-directed, which includes suicidal behavior and self-abuse
- Interpersonal, which includes violence between family members and intimate partners, and community violence between individuals who are unrelated
- Collective, which includes violence inflicted by large groups such as the government, mobs or terrorists.

A violent act can also be classified by its nature. The four categories are:

- Physical violence
- Sexual violence
- Psychological violence
- Violence involving depravation or neglect

According to the Centers for Disease Control and Prevention, in 2010, 28 percent of all injuries in Indian Country were the result of violence. Among 15-24-year-olds, violence accounted for 37 percent of all injury deaths in Indian Country. More than half of these deaths were suicides. Suicide is the second leading cause of death for ages 15-24, behind unintentional injuries.[9]

The Burden of Injury in Indian Country

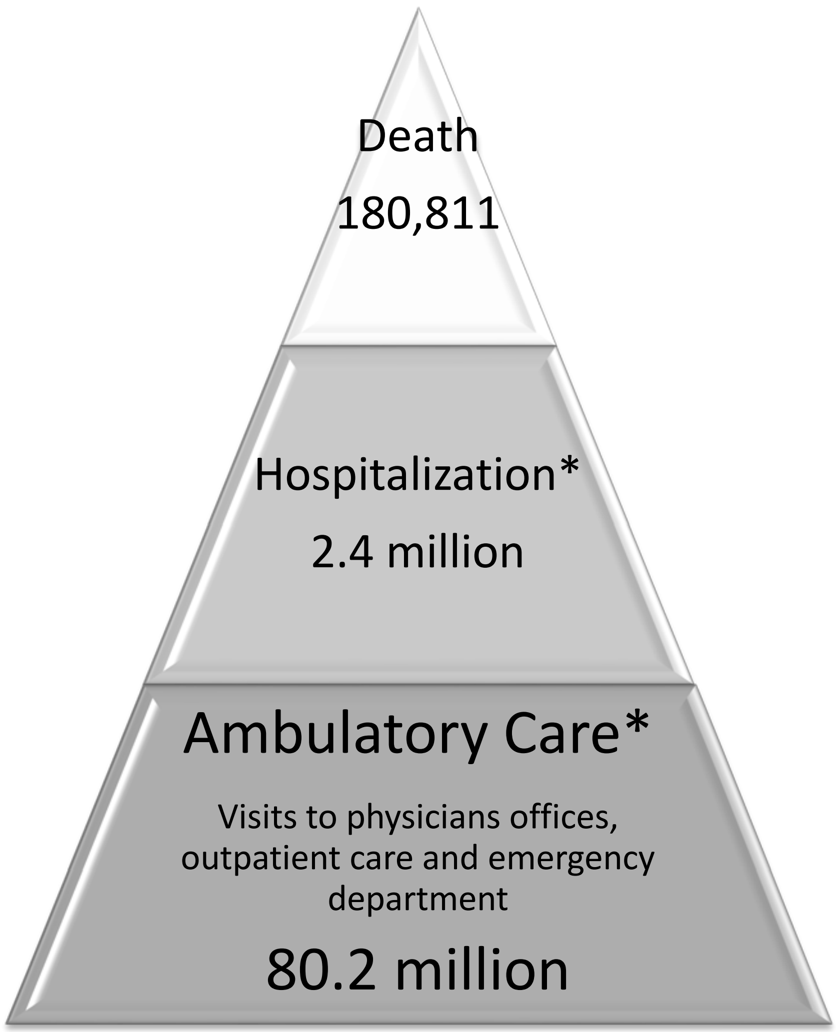
In 2010, more than 3,000 deaths in Indian Country were attributed to injuries. Nationwide, there were 180,811 deaths attributed to injuries. [10] But injury deaths are just the tip of the iceberg as the pyramid in Figure 1 on the next page illustrates (Note: this depicts data for the general U.S. population). The majority of injuries do not result in death, but they may require costly treatment or result in permanent disability.

Physical

Injuries take their heaviest toll on youth. Unintentional injuries are the leading cause of death for American Indians/Alaska Natives ages 1-44. In some cases, deaths from injuries among this group are two to three times higher than that of the general population. In 2010, 66,612 years of potential life were lost due to intentional and unintentional injuries.[11] Add to that the unmeasured years of productivity lost due to injuries that are debilitating but not fatal.

Financial
Injuries cost Indian Country more than $2 billion a year in medical care and rehabilitation costs, lost wages and productivity and administrative costs (see Table 3, p. 6).[12] In addition there are numerous additional costs, such as pre hospital care, dental care, mental health costs, long-term care, value of life-time earnings lost, etc., that are not factored into the figure above. The economic burden of injuries is particularly acute in Indian Country because health care funding is severely limited.

Figure 1. Injury Severity Pyramid General US Population



***Includes care administered for adverse effects of medical treatment**
Source: Centers for Disease Control and Prevention, FastStats
Based on Surveys from 2009-2011 http://www.cdc.gov/nchs/fastats/injury.htm

Table 3. Lifetime cost of AI/AN injuries: All injuries and selected causes, 2000 ($ millions)

	Medical Costs	Productivity Loss	Administrative Costs	Total Costs
All Injuries	$489	$1,477	$211	$2,176
Motor Vehicle	285	610	83	978
Suicide	19	156	20	194
Falls	30	89	16	135
Homicides	16	94	19	129
Fires	19	30	7	56

Source: Piland, Neil P. and Berger, Lawrence R. *The Economic Burden of Injuries Involving American Indians and Alaska Natives: A Critical Need for Prevention.* In The IHS Primary Care Provider, September 2007; Vol. 32, No. 9; p 269.

Emotional

The impact of injuries on individuals, families and communities can be devastating. The loss of mobility and income can put severe stress on an individual and his or her family. Not to mention the grief felt by family, friends and the community when injuries result in death.

Financial Benefits of Injury Prevention

Injury prevention can save lives and spare people needless suffering. It can also save money not just for individuals but for the community. Even if injury prevention efforts do not reduce all injuries, they can reduce the severity of injuries resulting in lower overall treatment costs. Fewer injuries or less severe injuries result in less money being spent on emergency medical treatment and more money available for other activities, such as economic development. In areas where medical facilities and doctors are in short supply, lowering the need for emergency treatment means that resources are available for elective and preventative health care.

Below is a list of some injury prevention efforts that have saved lives and money in AI/AN communities.

Interventions that Save Money in Indian Country

- DUI Laws
- Personal Flotation Devices
- Smoke Detectors
- Gun Locks
- Bike Helmets
- Primary Seat Belt Laws
- Street lights and guardrails
- Livestock Control
- Child Car Seat programs

Cost Outcome Analysis of Injury Prevention

Another way to judge the value of injury prevention efforts is to compare the cost of the intervention with the savings that result for the community because the number of injuries is reduced. Most tribal government officials will want to know that a program is producing the desired results and that it is cost effective. Table 4 below shows the average cost and the average cost savings realized by some common injury prevention programs that have been implemented in the United States.

Table 4. Cost Effectiveness of Injury Intervention

Intervention	Cost per Unit	Cost Benefit
Sobriety Checkpoints	$12,500 per checkpoint	$82,000 per checkpoint
Battery-Operated Smoke Alarms	$46 per alarm	$770 per alarm
Poison Control Centers	$43 per call	$320 per call
Bicycle Helmets, ages 3-14	$13 per helmet	$580 per helmet
Child Safety Seat Distribution, Ages 0-4	$55 per seat	$2,200 per seat

Source: Children's Safety Network, "Injury Prevention: What Works? A Summary of Cost-Outcome Analysis for Injury Prevention Programs (2012 Update)

Conceptual Models for Understanding and Preventing Injury

Injury events can involve a number of factors. A car crash, for example, may be related to speed or weather conditions or the ability of the driver or all of those things. Any approach to injury prevention should investigate and address the underlying factors that contribute to the injury. A number of models have been developed for the purpose of systematically investigating the cause and prevention of injury. You should be familiar with these models from the Indian Health Service Injury Prevention training, so they are only briefly reviewed here. More information on these models can be found in Appendix 2.

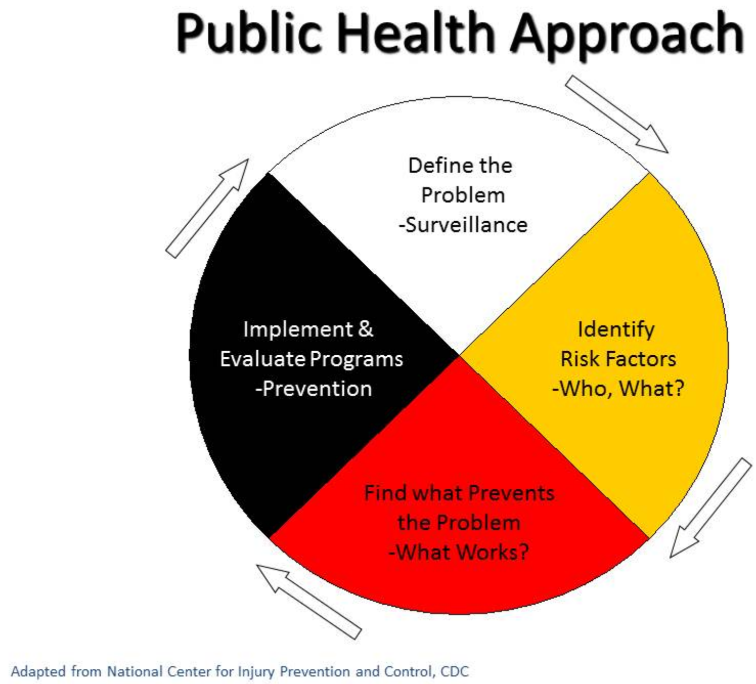
Public Health Approach

The public health model for injury prevention is concerned with the public in general as well as the health of individuals. The public health approach is a repeating four-step process and so the Indian Health Service depicts it with a Medicine Wheel (see Figure 2 next page).

In the public health model you:

1. Define the problem through surveillance
2. Identify the risk factors – who and /or what
3. Find out what works to prevent the problem
4. Implement and evaluate prevention programs

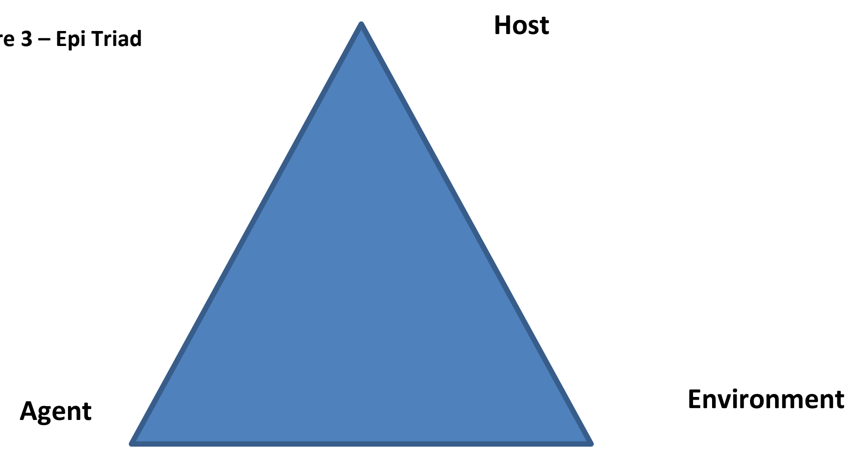
Figure 2.



Epidemiological Triad and the Haddon Matrix

Dr. William Haddon, the former director of the U.S. National Highway Traffic Safety Administration and the Insurance Institute for Highway Safety, introduced the application of epidemiological principals to injury research and intervention programs. Epidemiology considers the interaction of three factors in the development of disease: the host, the agent and the environment (see Figure 3 below). Haddon maintained that the same concept could be applied when examining the cause of injuries. Haddon applied the epidemiological principle to unintentional injuries, and particularly to injuries from motor vehicle crashes. [13]

Figure 3 – Epi Triad



In the Epi Model of injury prevention, the host is the injured person, the environment refers to the characteristics of the physical and social environment in which the injury occurred and the agent is the energy that is transferred to the body at a rate sufficient to cause injury. The Epi Model is a useful way of approaching injury prevention, because it gives the injury prevention specialist three different opportunities for intervention.

Haddon took the Epidemiological Model even further by adding a time element. The Haddon Matrix, as this model is called, examines each of the three factors considered in the Epi Triad at three different intervals of an injury event – pre-event, event and post-event. The Haddon Matrix helps chart the course of an injury and allows the injury prevention specialist to plan interventions at each interval.

Figure 4.

The Haddon Matrix

Factors

Phase		Host	Agent	Physical Environment	Social Environment
	Pre-Event				
	Event				
	Post-Event				

Figure 4 above illustrates the Haddon Matrix. If you were to apply the matrix to a car crash injury, for example, the pre-event phase would be the time before the crash takes place, the event phase would be during the crash, and the post event phase would be the time after the crash. You would then assess each of the factors that could have contributed to each phase of the crash – the condition or ability of the host/driver, the condition of the agent/vehicle, the condition of the physical environment/roads, weather, etc. and the conditions of the social elements, such as the enforcement of seat belt laws. In Section 6, we will review how the Haddon Matrix is used to identify potential interventions.

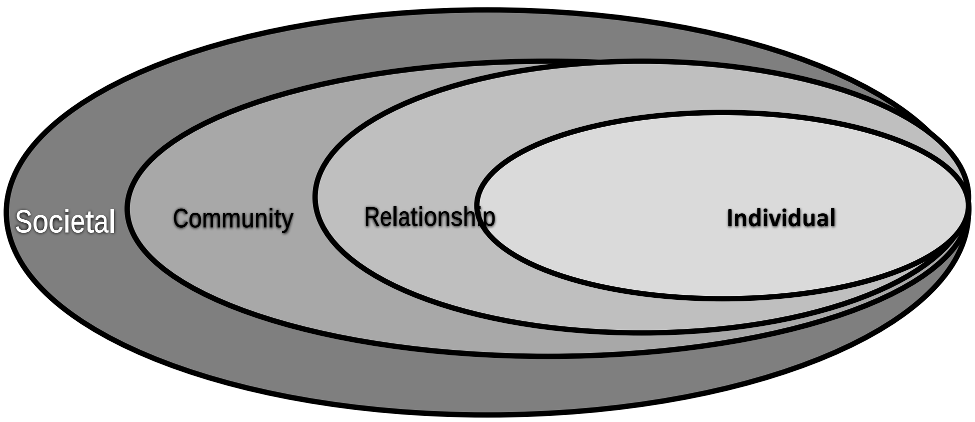
Ecological Model for Understanding Violence

Just as the Haddon Matrix assists in the understanding of unintentional injuries, the Ecological Model (see Figure 5 on next page) is helpful in understanding the cause and prevention of violence. The Ecological Model examines the interplay of the complex factors that increase or decrease the incidence of violence. It is useful in designing programs to address different types of violence and in identifying multiple points of intervention.[14]

The Ecological Model proposes that health and well-being are affected by dynamic interaction among biology, behavior and the environment and that this interaction changes over the life course. The ecological model considers the following factors:

- Individual Factors – Characteristics of the individual that increase the likelihood of being a victim or a perpetrator of violence
- Relationship Factors – Proximal social relationships that increase a person's risk for being a victim or perpetrator of violence
- Community Factors − Characteristics of a community that might increase the likelihood of violence
- Societal Factors – Factors that create an acceptable climate for violence, reduce inhibitions against violence and create or sustain gaps or tensions among different segments of society.

Figure 5. Ecological Model for Understanding Violence



Source: Krug, E, Dahlberg L, Mercy J, Zwi A, Lozano R. *World Report on Violence and Health.* Geneva: World Health Organization: 2002

Developing an Injury Surveillance System

Injuries are a significant health burden in the United States and particularly in Indian Country. Injury prevention efforts have been and will continue to be instrumental in reducing the health and financial impact of injuries. By continuously providing decision makers at the Tribal and Federal level with surveillance data that has been thoughtfully collected, analyzed and interpreted, you can help assure that injury prevention remains a priority for AI/AN communities.

The goal of this course is to show you how to develop a system of continuously collecting data, analyzing and interpreting it and then presenting the results to the people who need to know, including decision makers who can authorize funding and implement public policy to aid prevention efforts. Injury surveillance data is also used to assess the effectiveness of prevention efforts.

This manual explains a seven-step process for developing an Injury Surveillance System that is drawn from documents, such as the Injury Surveillance Guidelines from the World Health Organization.[15] Previously in the IHS Level II Injury Prevention Program you may have learned a 10-step process. Those 10 steps are incorporated into this process. The process is cyclical because when you reach the last step – evaluating the system – you'll want to review and revise other steps to continuously improve the quality of the system. Some of the steps may occur simultaneously or in a different order than given here. ***Not every step will be achievable or feasible for your situation. For example, it may not be possible to form a coalition, or obtain all the data you would want. Implement each step or as much of each step as you can. Modify steps as need be to fit your situation and seek help from an expert when needed.***

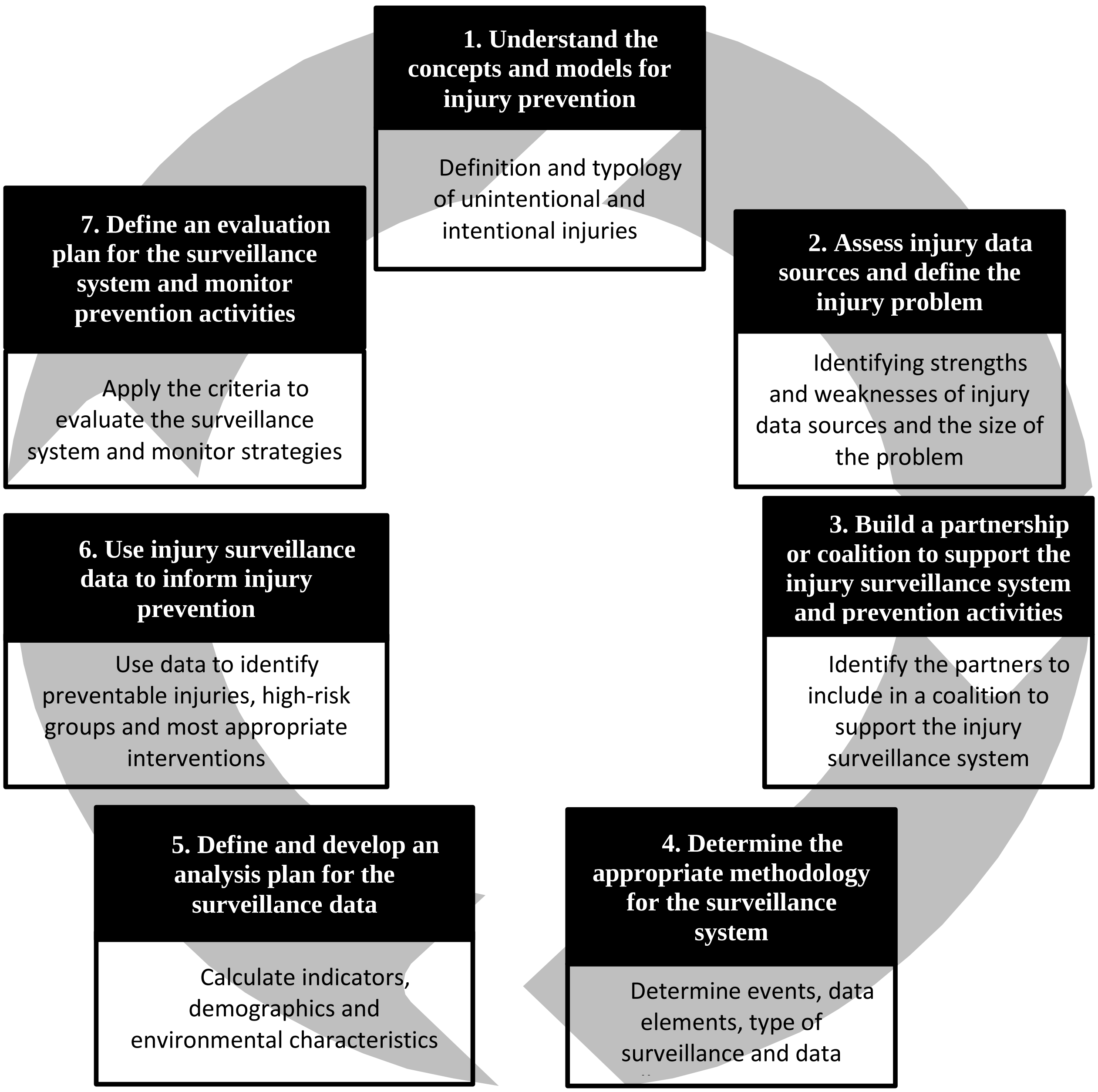
Steps to Develop and Maintain an Injury Surveillance System

Below are the seven steps for developing and maintaining an injury surveillance system, along with the activities or elements of each step. Step 1 was explained in this section. The other six steps will be discussed in each of the next six sections.

1. Understand the concepts and models for injury prevention
    - Understand the concepts, definitions and classification of injuries
    - Know the difference between violence related injuries and unintentional injuries
    - Describe the burden and cost of injuries
    - Know the conceptual models for understanding and preventing injury
    - Know the steps to develop an injury surveillance system
    - Understand the ethical considerations
2. Assess injury data sources and describe the injury problem
    - Identify the available data sources that can provide information to the surveillance system
    - Identify the injury data source strength and weakness
    - Describe the size of the injury problem
    - Compare the frequency of injuries calculated with the data from different sources
3. Build a partnership or coalition to support the injury surveillance system and prevention activities
    - Identify partners to include in the coalition
    - Identify local and national organizations working on injury prevention in the region
    - Define the existing social, legal and political framework in which an injury surveillance system and prevention activities may be established
4. Determine the appropriate methodology for the surveillance system
    - Define the injury events and data elements to be included in the system
    - Develop the data collection instrument and determine the data collection frequency
    - Plan for systemization, maintenance and data security
    - Define key positions
5. Define and develop an analysis plan for the surveillance data
    - Calculate injury indicators such as frequency, percentage, and crude, specific and adjusted rates
    - Calculate years of potential life lost
    - Describe the geographical analysis of the data
    - Define a plan to disseminate and communicate data
6. Use injury surveillance data to inform injury prevention
    - Understand the use of surveillance data to identify priority injuries in your region
    - Understand the models that can help identify risk factors and intervention strategies
    - Tie surveillance to action and funding
7. Define an evaluation plan for the surveillance system and monitor prevention activities
    - Know the steps to evaluating an injury surveillance system

- Use surveillance data to monitor prevention activities

Figure 5. **Seven Steps to Develop and Maintain an Injury Surveillance System**



Ethical Considerations and Cultural Awareness

A successful surveillance system depends on a trusting relationship between the people who gather data and the community. Every consideration must be given to protecting people's privacy when collecting data and publicizing the results. Privacy refers to the right of an individual to withhold or control the use of information about her or himself. Confidentiality refers to the obligation one has to protect information about someone. Small communities, such as many Alaska villages or Indian reservations make it difficult to ensure confidentiality. It's sometimes possible to identify people even when precautions have been taken. It's important to have clear policies in place to ensure confidentiality and privacy considerations are met.

The Privacy Act of 1974, a precursor to HIPAA, addresses how government agencies handle and maintain records about individuals. HIPAA requires HHS to address the security and privacy of health information, especially individually identifiable health information in all forms. You should be familiar with these laws from previous training. If you need a review, you will find information on further training in Appendix 3.

In addition to federal laws, the IHS and some Tribes have Institutional Review Boards (IRB). An IRB reviews and approves or disapproves research activities that use medical facilities, data, staff or, for the IHS, funding. The IRB will examine the informed consent process between the researcher and the volunteers, and the negotiations between the researcher and the Tribal community to verify that the research is safe, of benefit and respectful to participants.

It's important to be aware of the community standards for your activities. The process of collecting data and the procedure for using data from tribes may be different from other governments or organizations. And the process may differ from Tribe to Tribe. In addition, each Tribe in your area has a unique culture, which may impact your ability to collect data and publicize your results. It's important to be aware of and respect Tribal cultural concerns.

Summary

Now that you have completed this section you should:

- Understand the concepts, definitions and classification of injuries
- Know the difference between violence-related injury and unintentional injury
- Be able to describe the burden and the cost of injury
- Understand the conceptual models for understanding and preventing injuries
- Know the steps to developing an injury surveillance system
- Understand the ethical considerations associated with surveillance activity

Notes

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Resources

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Section 2: Assess Injury Data Sources and Describe Injury Problem

Learning Objectives

- Identify the injury data sources strengths and weaknesses
- Identify the available data sources that can provide information to the surveillance system
- Describe the size of the injury problem
- Compare the frequency of injury calculated from different data sources

Introduction

Data for an injury surveillance system can come from many sources, including the health sector, law enforcement, and the Tribal government. No data source is perfect. In Indian Country, data collection can be complicated by racial misclassifications, incomplete or missing patient charts, missing or incorrect codes for injuries, limited access to data on the Tribal level and the decentralized nature of the Indian Health Service data system, which is facility based. It's important to know the strengths and weaknesses of your data source so you can determine how it may impact your objective. This section reviews some common data sources and shows how data can be used to identify the scope of the injury problem.

Overview of Common Data Sources

Below are descriptions of some common data sources.

Death Certificates

Death certificates are an important and inexpensive source of information for fatal injuries. Information from death certificates is readily accessible from state and central databases. In some cases, however, death certificates may not contain enough information about the circumstances surrounding an injury, the victim or, in the event of violence, the perpetrator. Not all Tribal or IHS healthcare facilities report to the states, so state data may not reflect the complete number of deaths. Death certificates are not a good guide to determining the overall injury problem or the medical consequences, such as long term-disability.

Hospitalization

When combined with mortality data, hospitalization records can provide a much better picture of the injury problem and assist in describing the disability and healthcare costs associated with injuries. However, access to such data is more difficult because of privacy issues; the coding of causation is not consistent; it may be difficult or impossible to determine the ethnicity of the victim and it may require a manual review of records which can consume a great deal of time.

Outpatient Visits
For those with access to hospital or emergency department data, outpatient records may provide some good supplemental information on specific injuries such as sports injuries or eye injuries. However, many tribes only have an outpatient clinic for care where injuries requiring hospitalization are treated at non-tribal and non-IHS facilities and later billed for services through contract health. In this case, combined outpatient visits with contract health records can provide a better picture of the injury problem. Access to these records may prove difficult as practitioners are highly protective of their records. In addition, AI/AN patients may receive hospitalized care at non-tribal or non-IHS facilities without services paid by the IHS.

Police Reports
Police reports can also be an important source of information about injuries, particularly road traffic or violence related injuries. Police records can be very useful for determining the details surrounding an injury event, including, road conditions or the condition of the driver in the event of a crash or the condition of the perpetrator in the event of violence.

Records of Occupational Injuries
Information on injuries that occur in an occupational setting is sometimes available from the Department of Labor or organizations that monitor the industry.

State Data Sources
Some states keep registries of injury data, particularly traffic injury data, which can be accessed.

National Data Sources
The National Highway Traffic Safety Administration, Occupational Safety and Health Administration and other agencies within the federal government maintain a number of databases that might prove useful in your injury surveillance.

WISQARS
CDC’s WISQARS™ (Web-based Injury Statistics Query and Reporting System) is an interactive, online database that provides fatal and nonfatal injury, violent death, and cost of injury data from a variety of trusted sources. Researchers, the media, public health professionals, and the public can use WISQARS™ data to learn more about the public health and economic burden associated with unintentional and violence-related injury in the United States.
Users can search, sort, and view the injury data and create reports, charts, and maps based on the following:

- Intent of injury (unintentional injury, violence-related, homicide/assault, legal intervention, suicide/intentional self-harm)
- Mechanism (cause) of injury (e.g., fall, fire, firearm, motor vehicle crash, poisoning, suffocation)
- Body region (e.g., traumatic brain injury, spinal cord, torso, upper and lower extremities)
- Nature (type) of injury (e.g., fracture, dislocation, internal injury, open wound, amputation, and burn)
- Geographic location (national, regional, state) where the injury occurred
- Sex, race/ethnicity, and age of the injured person

Local or Tribal Newspaper Accounts

Newspaper accounts can sometimes offer a great deal of information about the victims of injury, including the age of the victim, the circumstances surrounding the injury event and the address of the victim.

Figure 1, below shows some common sources that could be used when investigating an injury death in Indian Country.

Figure 1

Determining the Strengths and Weaknesses of Each Data Source

Each institution collects data for different purposes based on its mission. Health institutions, for example, may focus more on the injury and less on the circumstances under which the injury occurred. Police may have a different view of what constitutes an injury and that may impact their traffic injury data. There is no perfect data source that will serve all the needs of your surveillance system. That is why it is important to judge the strengths and weaknesses of your potential data sources and determine which ones will best suit your needs.

When determining the strengths and weaknesses of a data source consider the following issues:

- Its usefulness for injury surveillance, research and practices.
- Estimates of its accuracy, completeness and representativeness
- Timeliness of the data
- Resource requirements (How long will it take you to collect the data? How much will it cost?)
- Simplicity

Data Assessment Exercise – Allow 15 minutes

Imagine that you have just been offered access to a new locally run database on youth activities in your region. Keeping the considerations on the previous page in mind, what questions would you ask to determine the strengths and weaknesses of the database. Refer to Appendix 4 for questions that have been suggested by others.

Determine the Jurisdiction of Each Data Source

When you are evaluating the strengths and weaknesses of a data source, it's important to understand the mission of each entity collecting data, the method they use to collect the data and the way data is received and flows from one level to the next. In an injury surveillance system using different sources, each source may report different information about the injury event depending on their point of intervention.

In a road traffic fatality, for example, the victim could die at the site, on the way to the hospital or in the hospital. At the hospital, the victim could die on the same day as the event or many days later. At the hospital, where the major concern is treating the victim, there may not be any information about the circumstances of the injury event. Police may gather information about the victim if he or she died at the scene, but not always. On the other hand, police reports may have more details about the circumstances surrounding the crash. Each data source may record a different time for the occurrence of the event.

At the hospital, there may be a discrepancy between the initial and final diagnosis. If a victim dies at the scene of a crash and doesn't make it to the hospital, the death will not be registered by the hospital.

Vital statistics offices collect information from the death certificates. If the death certificates are incomplete or inaccurate the data will be unreliable.

Determine Data Collection Method and Data Flow of Each Source

Data collection methods vary with institutions because each uses its own forms to collect information. This information is entered into databases and analyzed to produce reports. Police produce reports based on the information they collect at the scene of an injury event. Forensic medicine and public health officials prepare reports of cases they treat. Data collection and data flow can vary also among institutions depending on the technology available in each place.

For instance, when a death occurs, the funeral director obtains information from the family about the deceased person's education, occupation, birthplace, racial identity, etc. The local Coroner/Medical Examiner supplies cause-of-death information and basic information about the context of the death. The certificate is then filed with the local or state health department. In most states, the health department assigns the ICD cause of death code, usually with software assistance.

There are three types of death certificate data:

- Death Certificate is usually available within 30 days after the death. It includes cause of death and nature of injury, but not necessarily in coded format.
- Preliminary electronic data, either in electronic form or hard copy printout, are sometimes available within weeks of a death certificate being filed.

- Final death certificate data – cleaned and coded – may not be available for a year or more

The process for investigating an injury death in Indian Country may vary greatly from Tribe to Tribe. Some Tribes do not have a Coroner or Medical Examiner. Some Tribes do not believe in autopsies, so the cause of death may be unknown or inaccurate. Sometimes outside Medical Examiners are called in. Sometimes, in the event of a homicide, the FBI will have jurisdiction. All of these different institutions are a source of data.

Identify Data Sources to Include in a Surveillance System

The injury events to be included in a surveillance system will determine which data sources are necessary to provide information to the system. The availability of quality data is important when selecting data sources. Take advantage of existing data sources. There may be some limitations depending on the intent of the data collection, but almost all data sources have some limitations. Using existing data sources will save you time.

Table 1 below shows the possible data sources based on the injury event and the availability of data. The shaded boxes indicate that the data source is the best for the given event. The entities listed may have data from the national, state or local level. This is only an example and availability of data and sources may vary from one community to the next. You will find a more complete list of data sources in Appendix 5 of this manual.

Table 1. Possible Data Sources by Event

	Police (Tribal, BIA, County, State)	Forensic Medicine (Medical Examiner, Medical Officer, Coroner)	Public Health (State Registries)	Health Care Delivery (Community Health Rep., Clinic, Hospitals)	Family/Community (Family of victim, newspaper articles, obituaries)	Tribal Resources (Enrollment records, death records, etc.)
Fatal Events						
Homicide						
Suicide						
Transportation Related Death						
Other Unintentional Death						
Non-fatal Events						
Homicide attempt						
Suicide Attempt						
Transportation Related Injury						
Other Unintentional Injuries						
Domestic Violence						
Child Abuse						
Elder Abuse						

Linkage with Other Data Sources

A single database may not provide all the information you need for your surveillance system. You might consider using data from more than one source – either by combining data from different sources, such as supplementing police crash data with state crash data, or by electronically linking data sets.

It would be ideal to be able to compare data sources, but for most of Indian Country it is not practical. Some of the advantages and disadvantages of data linkage are noted below. It is good to weigh both when you're considering this strategy.

Advantages

- It offers supplemental data
- You might obtain more comprehensive descriptions of an injury event
- Highlights the completeness of data available from each source
- It may improve data quality

Disadvantages

- Personal identifiers may compromise confidentiality
- Interagency politics
- Different storage media may create technological problems that eat up time
- Data quality may not be better
- There may be duplicate cases when combining two databases

Conduct Preliminary Data Analysis

Develop a strategy or a method to ensure cases are not counted more than once. The goal is to eliminate duplicate cases to ensure the data is accurate.

To understand the nuances of a data source and gauge its completeness and adequacy it is important to conduct preliminary data analysis. Start with the analysis of a broad category, such as interpersonal violence. Then go more in depth if possible, for example, domestic violence against women. Epidemiologists can be useful in this step. Seek them out from such places as state health departments, epidemiology centers, academic institutions and among graduate students. You will find a list of Tribal Epidemiology Centers (TECs) and contact information in Appendix 6 of this manual.

Using Data to Define the Injury Problem

The collection of data is vital to defining the injury problem and identifying a solution. Data will allow you to identify who is being injured and how, and better identify the cause and severity of injury. This will be discussed in more detail in Section 4. The purpose of this section is to help you review mortality data, such as the frequency of the 20 leading cause of death and the leading causes of injury death, to define the injury problem. If morbidity data are available, such as hospital discharge data, they can be used to broaden the understanding of the problem.

Determining the Frequency of the Leading Causes of Death and of Injury Deaths

Deaths are commonly used to describe and compare public health problems in part because deaths are well defined and detailed mortality data is often available. Data on fatalities and on motor vehicle and other unintentional injuries can provide an indication of the extent of an injury problem in a community or state. These data can also be useful for monitoring changes in injury rates over time, identifying high

risk groups or communities and making comparison among groups. These data are also useful for motivating stakeholders to support injury prevention and in building a partnership or coalition.
Once the leading causes of death are known, the next step is to determine the leading causes of injury deaths. Table 2, below , compares the ten leading causes of death in the United States with the ten leading causes of death in Indian Country. As you can see, unintentional injuries rank 5th for the general U.S. population and 3rd for Indian Country[1]. Table 3, below, shows the 10 leading causes of injury deaths in Indian Country. As you can see in that table, motor vehicle crashes are the leading cause of injury deaths in Indian Country.[2]
Table 2

10 Leading Causes of Death 2010

General US Population			American Indian/Alaska Native		
Rank	**Cause of Death**	**Number**	**Rank**	**Cause of Death**	**Number**
1	Heart Disease	597689	1	Malignant Neoplasms	2962
2	Malignant Neoplasms	574743	2	Heart Disease	2793
3	Chronic Low. Respiratory Disease	138080	3	Unintentional Injury	1701
4	Cerebrovascular	129476	4	Diabetes Mellitus	857
5	Unintentional Injury	120859	5	Liver Disease	787
6	Alzheimer's Disease	83494	6	Chronic Low. Respiratory Disease	702
7	Diabetes Mellitus	69071	7	Cerebrovascular	559
8	Nephritis	50476	8	Suicide	469
9	Influenza & Pneumonia	50097	9	Nephritis	339
10	Suicide	38364	10	Influenza & Pneumonia	326

Data Source: National Center for Health Statistics (NCHS), National Vital Statistics System Accessed through WISQARS™ May 5, 2013

10 Leading Causes of AI/AN Injury Deaths 2010

Rank	Cause of Death	Number
1	Unintentional MV Traffic	610
2	Unintentional Poisoning	521
3	Suicide Suffocation	206
4	Suicide Firearm	178
5	Unintentional Fall	161
6	Homicide Firearm	113
7	Unintentional Suffocation	69
8	Unintentional Drowning	68
9	Suicide Poisoning	64
10	Unintentional Natural/ Environment	62

Data Source: National Center for Health Statistics (NCHS), National Vital Statistics System Accessed through WISQARS™ May 5, 2013

Compare Frequency of Injuries Calculated with Data from Different Sources

Injury data are commonly collected for different reasons depending on the mission of the institution collecting the data. Identifying the goal behind each and comparing their goals with the objectives of a surveillance system will help explain the differences in the numbers. In Indian Country, there may be a high proportion of patients who are transported from tribal or IHS facilities to other facilities for treatment. Be aware that data collected by institutions outside Indian Country may contain racial misclassifications, which will skew the numbers.

Table 4 below shows the discrepancies in the number of motor vehicle crash victims in the data collected by different institutions within an IHS service unit. [3]

Table 4. **Motor Vehicle Crash-Related ED Visits and Emergency Transports, Hospitalizations, and Fatalities by Data Source, 2001 for a tribe within an unidentified IHS Service Unit**

	(1) IHS Severe Injury Surveillance System = Emergency Room log + IHS medical records	**(2) Tribal Police reports + IHS medical records**	**(3) Tribal EMS + IHS medical records + discharge planning records**	**(4) State's Health Department Data**	**(5) IHS Contract Health Services**	**Total unduplicated cases from all data sources**
IHS ER visits – no record of emergency transport to another hospital	0	24	25	0	0	**29**
Transport to IHS ER, subsequent transport to another hospital	21	5	9	0	0	**21**
Direct transports from the scene to other hospitals, disposition unknown	0	50	33	0	0	**68**
Hospitalizations	0	2	9	0	0	**11**
Fatalities	0	6	1	9	0	**10**

Source: The IHS Primary Care Provider; February 2010, Vol. 35, No. 2; p. 25.

Summary

Now that you've completed this section you should be able to:

- Identify injury data sources and the strengths and weaknesses of each
- Identify available data sources that can provide information to your surveillance system
- Describe the size of the injury problem

Notes

Resources & References

Resources

Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS) [online]. (2005) [cited 2013 May 5]. Available from URL:www.cdc.gov/ncipc/wisqars

Espitia-Hardeman V, Paulozzi L. *Injury Surveillance Training Manual*. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control; 2005

References

[1] Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS) [online]. (2005) [cited 2013 May 5]. Available from URL:www.cdc.gov/ncipc/wisqars

[2] Ibid.

[3] Tsatoke G, Berger L, Hicks K, Piontkowski S. *Challenges to Injury Surveillance at the Local Level.* Phoenix, AZ: The IHS Primary Care Provider, February 2010. Vol. 35 No. 2; p. 25

Section 3: Build a Partnership or Coalition to Support the Injury Surveillance System and Prevention Activities

Learning Objectives

- Identify partners to include in the system
- Identify local, regional and national organizations working on injury prevention in your area
- Define the existing social, legal and political framework in which an injury surveillance system and prevention activities may be established

Introduction

A coalition is an alliance of organizations working together for a common purpose. Ideally an injury surveillance system would include people from many different sectors in the community with different skill sets and expertise to lend to the effort. However, this may not be a practical approach in Indian Country. In most circumstances the work of surveillance will fall to one or two people. It might make more sense to identify a few people you can call on for advice or assistance from time to time.

If forming a formal coalition or partnership, below are some things that you may want to consider. [1]

- Commitment of lead agency
- Effective core planning group
- Planned recruitment of coalition members
- Coalition structure
- Staff roles
- Mission and goals
- Leadership
- Education of coalition members
- Ownership and commitment of coalition members
- Successful implementation of pilot project
- Recognition for members

Identify Partners to Include in the Coalition

When identifying partners to include in your system or to assist you, consider the following:

- The different roles that might be necessary to the success of your surveillance system. Include people with different expertise. For example, is there someone at a health center that can provide information on HIPAA guidelines for that center.
- Who might have access to the different data sources you need such as, someone from the tribal police department, health personnel (community health reps, EMS team, tribal clinical staff), tribal court staff

- What support do you need and which organizations can provide that support
- Whose objectives overlap with yours
- What role will the organization members fulfill
- What kind of data do they collect
- Why do they collect data
- Can you share or link data
- What are their sources of data

The table below shows some possible institutions and participants for an injury surveillance coalition or partnership.[2]

Table 1

Partner	Institutions	Participants
Health	Community Health Representatives, Hospitals , Health Centers, IHS Hospital, tribal clinic, Trauma registry	Epidemiologists, doctors, nurses, health educators, health promoters, paramedics, and other health workers
Justice	Forensic Medicine Offices (Coroner/Medical Examiner), Courts, Public Defenders' Offices, Prosecutors' Offices, Family Services or Counseling	Forensic pathologists, judges, public defenders, prosecutors or their assistants, directors or professional staff of family services or family counseling
Law Enforcement	Police (Homicide Investigation Office) Security Companies	Regional or local police chiefs, statistical officers
Transportation	Transportation Departments and Offices	Department directors or traffic police, statistical officers
Administration	Planning Departments	Statisticians, geographers
Education	Universities , Colleges, Schools	Researchers, professors, and student leaders
Community	Community Organizations Youth and Mothers' Organizations Religious Organizations	Community leaders, youth leaders, community groups Pastors or other religious leaders
Private Organizations	Nongovernmental Organizations Insurance Agencies	Spokespersons and leaders of private organizations, statisticians
Political	National, Regional, and Local Authorities	Staff in the president's, governor's, or mayor's offices, tribal council
Media	Television, Radio, Newspapers	Journalists and personnel working in mass media

Adapted from: Concha-Eastman A, Villaveces A. *Guidelines for the Design, Implementation, and Evaluation of Epidemiological Surveillance Systems on Violence and Injuries.* Washington, DC: Pan American Health Organization; 2001.

Identify Local and State Organizations Working in Injury Prevention

Injury prevention is a goal for many institutions within and outside the health sector. Some of these institutions can be sources of financial or technical assistance. [3]

Since injury prevention is best done at the local level where problems can be addressed, there is an opportunity to form a local coalition of institutions that share a concern about an injury problem and in doing so, strengthen the response and probability of having an impact.

Some organizations that may be working on injury prevention include:

- Health Care Providers
- Police Departments
- Fire Departments
- Schools
- Social Service Agencies
- Employers
- Government Agencies
- Local IP Coalition
- County IP Coalition
- State Death Review Team
- Trauma Registry

At the national level, a variety of government institutions −not just the Indian Health Service, but the Bureau of Indian Affairs, the Department of Education, the National Parks Service − might be working on preventing injuries, such as violence- or traffic-related injuries. Similar agencies exist at the state and local level, such as Education Department, the Parks Department. And locally and across the nation, church and non-profit organizations have formed to address a number of injury issues, such as violence prevention.

Determine the Existing Social, Legal and Political Framework

It's important to be aware of the social, political and legal implications that injury surveillance or prevention programs might have in your community. For example, does the tribal council have an interest in doing something to address the possible cause of injuries, such as domestic violence or driving under the influence of alcohol? Is there money for surveillance or prevention efforts? Would community members be apprehensive about privacy issues? Are there socially or culturally acceptable practices that might come under scrutiny as the result of surveillance?

If your surveillance efforts are successful, the data you gather and present will drive policy at the local level and maybe even at the national or state level. Depending on your focus, you may experience resistance for any of a number of reasons, including those mentioned above.

Summary

Now that you've completed this section, you should be able to:

- Identify partners to include in the system
- Identify local, regional and national organizations working on injury prevention in your area
- Define the existing social, legal and political framework in which an injury surveillance system and prevention activities may be established.

Resources & References

Resources

Espitia-Hardeman V, Paulozzi L. *Injury Surveillance Training Manual*. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control; 2005.

References

[1] Brownson R, Remington P, Davis J, eds. *Chronic Disease Epidemiology and Control*. Washington, DC: American Public Health Association; 1993.

2 Concha-Eastman A, Villaveces A. Guidelines for the Design, Implementation, and Evaluation of Epidemiological Surveillance Systems on Violence and Injuries. Washington, DC: Pan American Health Organization; 2001.

[3] Bonnie RJ, Fulco CE, Liverman CT, eds. *Reducing the Burden of Injury: Advancing Prevention and Treatment*. Washington, DC: National Academy Press; 1999.

Section 4: Determine the Appropriate Methodology for Your Surveillance System

Learning Objectives

- Define the injury events and data elements to include in the system
- Develop the data collection instrument and determine the data collection frequency
- Plan for systemization maintenance and data security
- Define key positions

Introduction

When selecting a methodology for your injury surveillance system, several factors must be taken into consideration, including data needs and existing resources. In this section we will discuss the key elements that must be addressed:

- What are your objectives in developing the system
- What injury events do you want to include in your system
- What is your case definition
- Variables
- Data collection instruments
- Systemization of data
- Required staff

Considerations When Developing a Methodology

The following considerations will help you determine the appropriate methodology for your system[1].

1. What do you and other stakeholders want the system to do? Should it be comprehensive, gathering data on all types of injuries? Or should it focus on a particular injury?
2. The size and the type of the injury problem. The magnitude of an injury problem in your area may impact which injury events you decide to monitor.
3. Availability of data sources. You must identify the sources of information for the system. In Section 2 we talked about identifying appropriate data sources and how to determine their strengths and weaknesses.
4. Access to information. How easy or difficult will it be to get the information you need from the institutions that have it?
5. Political priorities. Involving stakeholders and elected officials in the development of your system will keep them informed and will help you understand their priorities .
6. Potential for intervention. The primary goal of an injury surveillance system is to identify appropriate interventions. You should not waste time and resources on collected data and data analysis if it won't result in prevention activity.[2]

7. Sustainability. Make sure the system you design will be able to be sustained by the resources you have available, both staff and financial resources.
8. Keep in mind the plan for data collection from the IHS Level 2 course: identify the topic; narrow your focus; identify a specific question; anticipate data needs; develop and pre-test your instrument.

Define the Injury Events and Determine the Data Elements to Include in Your Surveillance System

Injury Case Definition

The first task in creating your surveillance system is determining the objectives of your system and then deciding what injury events should be included.

A surveillance system can have any one of a number of objectives, including the following:

- Identifying emerging hazards
- Describing injury patterns to justify the need for intervention
- Assessing the impact of a prevention program
- Determining the health care costs associated with injury
- Determining the magnitude of an injury problem
- Determining the characteristics of injury events

Being aware of the objectives of your system will help you develop a case definition. The injury definition and case definition are inter-related.

The case definition should:

- Be clearly stated and easily understood
- Use comparable definitions as those used elsewhere – for example, the national definition for elderly is 65 or older; yours should be the same
- Contain a clear statement of the following
  - Person: race, tribe, age, gender
  - Place: state, reservation, roadway
  - Time: year, time of day, day of week, specific dates (4th of July), weekends
  - Intentionality: intentional/unintentional/undetermined intention, legal intervention
  - Age grouping
  - Severity: non-fatal, fatal, disability

The biggest decision you will make regarding your case definition is determining the severity of the injuries you will track. The Injury Severity Pyramid in Section 1, Page 1-5, ranks the severity of injuries based on the degree of medical intervention required. There are advantages and disadvantages to tracking cases at each level as noted below and on the following pages.

Deaths

Advantages

- Data is readily accessible from death certificates which are tracked by the state and kept in a central database

- Cause of death is consistently reported on death certificates
- Race or ethnicity information is usually available

Disadvantages

- Rare event. Injury deaths represent less than 1% of injury events
- Not a good guide to ascertaining overall injury problem or medical consequences, such as long term disability
- Influenced by small numbers, especially in small populations or over a short period of time

Hospitalization

Advantages

- When combined with mortality data it offers a better picture of the overall problem
- Disability and healthcare costs can be better described
- Data can be collected by staff
- Patients are captive audience that can be interviewed at the hospital, along with their relatives

Disadvantages

- Access to data is more difficult
- Privacy is more of a consideration
- Records may be manual
- Inconsistent, incomplete or incorrect coding of injury causation
- Race or ethnicity information is sometimes not available
- May not be representative of the problem as only most severe injuries require hospitalization

ED Visits (Under Ambulatory Care on pyramid)

Advantages

- When combined with death and hospitalization data, helps provide the big picture
- If you're dealing with a small population and have limited injury and mortality information you may benefit from casting the net wider
- Can be useful for specialized studies
- Data can be collected by staff
- Patients are captive audience that can be interviewed at the hospital, along with their relatives

Disadvantages

- Large number of cases may be difficult to handle
- Access to data may be difficult
- Records may be manual
- Inconsistent, incomplete or incorrect coding of injury causation
- Race or ethnicity information is not readily available from non-local sources

Outpatient Visits (Under Ambulatory Care on pyramid)

Advantages

- Clinics might be a primary source of information if there is no hospital
- May be good for specialized injuries, such as sports related injuries or eye injuries

- Might be good supplemental information
- Maybe the only source of data in some places

Disadvantages

- Difficult access
- Privacy issues (data is highly protected by practitioners)
- Race or ethnicity information is not readily available

It's not necessary to be all-encompassing at the outset. Start small, tracking deaths and the most severe injuries. Plan to expand or phase in other levels of severity as your resources permit. ***You can initiate prevention efforts without knowing everything about every injury in your community.***

Exercise 1

Case Definition

1. Think of some potential injury concerns in your community. Write a case definition for that scenario.
2. The primary data you intend to use is hospital ED records and patient medical charts
3. Considerations: person, place, time, intent, severity
4. Evaluate them based on criteria on page 4-2.

The Use of ICD Codes in Your System

In selecting a case definition for your injury surveillance system, you could use ICD codes.

The use of standard codes in your system allows the accurate comparison of state, local, and international data to assess the magnitude and distribution of injuries as a public health problem. In the public health sector, mortality data on death certificates are coded using the International Classification of Diseases (ICD) codes. ICD codes translate verbal descriptions, usually provided by a physician or medical examiner or from hospital inpatient or outpatient records, into coded descriptions that can be grouped together for statistical purposes.[3] ICD is the international standard diagnostic classification system for all general epidemiological purposes, many health management purposes and for clinical use, including billing. ICD includes codes for diagnosis of disease and injury; and cause of injury codes.[4]

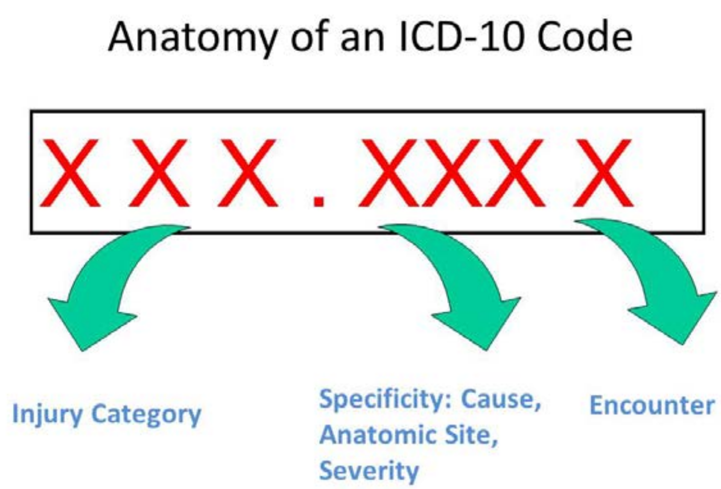
Since 1948, the World Health Organization (WHO) has had responsibility for preparing and publishing ICD codes and all revisions. [5] In 1999, the tenth revision of ICD codes (ICD-10) replaced the ninth revision (ICD-9). In the ICD-9, external causes of death were coded with a supplementary set of codes (commonly known as E-codes). E-codes indicated the mechanism causing death (e.g., a motor vehicle traffic crash) and the injuries resulting from the external causes (e.g., fractures, open wounds), both of which were listed as contributing causes on the death certificate. In the ICD-10, external causes are classified under a series of alphanumeric codes, V01–Y98.[6] (For a list of ICD-10 codes, see: Ftp://Ftp.cdc.gov/pub/Health_Statistics/NCHS/Publications/ICD10/).

Another classification is the ICD-9-CM, which is a clinical modification of ICD-9. ICD-9-CM codes are widely used to code external causes of injury for visits in hospitals, emergency departments, and ambulatory care settings across the United States. However, within the next few years, the ICD-9-CM classification system will be replaced with the ICD-10-CM coding system, including expansion of external-cause-of injury codes. When implemented, ICD-10-CM will allow for more detailed coding of the external cause of injury based on information in the medical record about injury circumstances (e.g., intentionality, mechanism, place of occurrence, and activity at the time of injury).

Currently in the United States, both ICD -9 and ICD-10 codes are in use. ICD-9 codes are used for coding the diagnosis of non-fatal illness and injuries and ICD-10 codes are used for coding the diagnosis of fatal illnesses and injuries. Most countries use ICD-10 codes for both non-fatal and fatal diagnoses. Beginning October 1, 2014, the United States will implement the use of ICD-10 codes for both fatal and non-fatal illnesses and injuries. As of October 1, 2014 all Indian Health Service/Tribal/Urban programs must use ICD-10 codes on all HIPAA electronic record transactions.

ICD-10 codes are not simply an update of ICD-9. There are changes in structure and content of the codes that make them very different from ICD-9. The structure allows for greater detail. In addition, the code sets include greater detail, changes in terminology and expanded concepts for injuries, laterality (right or left side) and related factors.[7] ICD-9 has 17,000 codes compared 141,000 codes for ICD-10.

An ICD-10 Code consists of three to seven characters. The first digit is a letter. Second digit is a number and third through seventh digits can be alpha or numeric. A decimal placed after the first three characters. As is illustrated in the diagram below, the first three digits are a category of injury, the next three digits are for the cause, anatomical site or severity of injury and the final digit is an extension used to indicate whether the visit was an initial encounter or subsequent encounter or the result of a chronic condition resulting from the original injury.[8]



For more information on ICD codes, you can check the following web sites:

- American Academy of Professional Coders
  http://www.aapc.com/

- World Health Organization
  http://www.who.int/classifications/icd/en/

- CDC National Center for Health Statistics
  http://www.cdc.gov/nchs/icd.htm

If you decide to include other data sources in your system, such as law enforcement, you must keep in mind that these sources use different definitions for incidents, such as assault or neglect. Table 1 below shows how the definitions used for ICD-10 Codes compared to those used in the law enforcement sector. You should also keep in mind that updates to the codes can impact multi-year analysis of data. For example, if a code for "fall from skateboard" is introduced in year three of the five-year dataset, and you didn't know that it was a new code, you would think there were no injuries from skateboard falls prior to year three.

Table 2. Case Definition for Violence-Related Injuries: Public Health versus Law Enforcement

Public Health (ICD-10)*	Law Enforcement**
Assault (X85–Y09): Includes homicide and injuries inflicted by another person with intent to injure or kill, by any means. Excludes: Legal intervention and operations of war. Assaults are classified by mechanism; a four-digit code is used for place of occurrence of the event and for activity of the victim.	**Criminal Homicide:** Murder and no negligent manslaughter: the willful killing of one human being by another. **Aggravated Assault:** An unlawful attack by one person upon another for the purpose of inflicting severe or aggravated bodily injury. This type of assault is usually accompanied by the use of a weapon or by means likely to provide death or great bodily harm. **Other Assaults:** Assaults and attempted assaults in which no weapons are used and do not result in serious or aggravated injury to the victim.
Legal Intervention (Y35): Includes legal intervention according to the mechanism: Involves firearm discharge, explosives, gas, blunt object, sharp objects, legal execution, other means, and unspecified.	**Justifiable Homicide (Not a Crime):** Killing of a felon by a law enforcement officer in the line of duty. The killing of a felon, during the commission of a felony, by a private citizen.
Neglect and Abandonment (Y06): Classified according to the perpetrator: Spouse or partner, parent, acquaintance or friend, other specified persons, unspecified person.	**Manslaughter by Negligence:** The killing of another person through gross negligence.

* *International Statistical Classification of Diseases and Related Health Problems* (ICD-10)

** *National Incident-Based Reporting System Volume 1: Data Collection Guidelines* (Uniform Crime Reporting—FBI), available at: www.fbi.gov/ucr/nibrs/manuals/v1all.pdf.

The advantages and disadvantages of e-coding are listed below.

Advantages

- Allows the ability to identify trends
- Allows the ability to describe the specific causes and contributing factors associated with an injury
- Standardization of injury descriptions which can aid in sharing data or linking databases.
- As of October 1, 2014 all Indian Health Service/Tribal/Urban programs must use ICD-10 codes on all HIPAA electronic record transactions.

Disadvantages

- Not all records are coded
- Records are miscoded or inconsistently coded
- Poor chart information results in non-specific e-code
- Don't always provide the desired specificity
- You must stay apprised of updates
- Previously not required for billing, so seen by some coders as unnecessary

Exercise 2

Coding Exercise

Code as many of the diagnoses on the handout as time allows. Your instructor will provide the necessary codes.

Determine the Variables to Include in Your System

Data elements are the variables needed for each injury event, such as the demographic information, information on the time of the event, information on where the event took place or where the victim died and the circumstances surrounding the event. The case definitions and codes are included in the data elements as well.

The variables you define will determine the data you collect and the data collection form you develop. When determining the variables, keep the goal of surveillance in mind. The goal is prevention activity. There's value in collecting as much information as possible, but the more information you try to collect, the less likely your form will be filled out accurately or at all. A simple form will be more likely to yield information, even if it's not all the information you would like. Some IHS areas have used a two-phased approach. A Phase 1 form is used to collect basic information about an injury. A Phase 2 form is used to collect more detailed information based on the specific injury. There are examples of these forms in Appendix 7.

The variables you choose to include will depend on many things, including your locality, culture and the availability of data sources. Be realistic about what you include based on your circumstances and location. Below are some commonly included variables.

- Name/Identifier -- The name of the injured person is often not available. For surveillance purposes it is not used or not collected because of privacy issues. Use hospital case number or

DOB in lieu of name. It's important to use some kind of unique identifier in place of a name to avoid a duplication of cases, particularly when you are using data from two or more sources.

- Age and sex
- Marital Status
- Education Level – Consider whether this information is needed. Will knowing the education level of the victim impact your intervention activities?
- Employment Level – Same consideration as Education Level. Will it impact intervention? In some circumstances it could help you determine work-related injuries.
- BAC – This is an important variable, but it's not always available. You may have to settle for "Alcohol-involved" or "Alcohol-related" designations. If you are using "alcohol-involved" or "alcohol-related" you will have to check with the local government or law enforcement to determine how these designations are defined.
- Occupant Protection for Transportation – Transportation includes all modes, such as horses, skateboards, bicycles as well as motorized vehicles, such as snow mobiles, boats. Protection includes seat belts, helmets, life jackets, etc.
- Time – This is the date and time of an injury event. Ideally it's the time the injury occurred, but most of the time you will only know the time of medical treatment. Choose one variant and go with it, even if it's not the most accurate indication of when the injury occurred. A drawback to choosing the time of treatment is that in some cases people don't seek medical treatment until much later.
- Place – This could be the place where the injury occurred and/or the residence of the injured person. Injuries often occur when people travel to places for activities – hunting, fishing, drinking − ideally you collect both. Sometimes the information is very general – such as the nearest village. Specifics are great, but if you can't get them you work with what you have.
- Circumstances surrounding the injury event – This could include information about the following.
    - Relationship of victim to aggressor
    - Mechanism
    - Context
    - Criminal history of victim and/or aggressor

Variables Sometimes Included in IHS Surveillance Systems[9]	
Service Unit	Date of Visit
Community	Length of Stay
Chart No.	E-Code or External Cause of Injury
Age	Description of Injury Event
Sex	

Develop Data Collection Instrument and Determine Data Collection Frequency

Designing a form

Once you've determined what you want in your system, you must design a form that will capture all the data/variables you've decided to include.

Most of your data collection will involve record extraction, which means it will be gathered from someone or someplace, such as the Tribal police or the health clinic, that is already recording the information you need to know. The form you develop will assist you in the collection of the information.

There is no right or wrong way to design a form. In Appendix 7 you will find examples of forms used by other surveillance systems in Indian Country. Each surveillance system is unique and will have access to different data. The form you design should fit the needs of your system and the available data sources. Find something that works for you and stick with it. Below are some things to consider when designing a form for your system.

- Define what you want in your system first. This will lead to the creation of a form.
- Keep it simple. The simpler the form, the greater its usefulness over a long period of time.
- Only include the data you need and then use analysis to answer case definition questions later.
- Make sure it is well-designed and easy to follow or read.
- Decide whether or not to pre-code the form – provide a pre-coded list of possible answers, rather than filling the answers in. If you do pre-code, use numbers if possible. Numbers are easier to process and less prone to errors. You will need to develop a list of codes as a reference.

Pre-test your form

It's very important to pre-test a draft of your data-collection instrument or form before you begin a full-scale investigation. Get feedback from anyone who will use it and make modifications as necessary. Pre-testing helps identify if the questions and format are appropriate, clear, and relevant and result in the appropriate data. It will also help you determine if the case definition is accurate. It's not unusual to change a form two or three times before implementing it.

Frequency of Data Collection

The frequency with which you collect data will depend on your circumstances. You will want to consider the magnitude of the injury problem in your area which will impact the number of cases you're reviewing, your resources (both human and financial), whether your data collection is active or passive (see below) and the needs of your system.

Active and Passive Data Collection

Active surveillance involves seeking out cases, investigating them and interviewing injured people with follow-up. Active surveillance usually involves large expenditures of time and money. Though active surveillance is not usually practical at the local level, sometimes it is done as a follow up to gather more information on specific injuries after you've looked at the initial data.

Most surveillance done at the area or regional level is passive surveillance. In this approach, you're using data from sources that gather information in the process of doing other routine tasks. The generation of data may not be the primary focus of the organization that yields the data, but it's possible to get the data you need from the forms filled out by the personnel in these other systems.

Data Collection Planning Summary

- Decide what you want out of your system
- Identify your case definition
- Define your variables
- Develop your form
- Consider how HIPAA/privacy issues may impact your data collection efforts
- Test it

Exercise 3

Turn to Appendix 7 of this manual where there are examples of various forms being used in surveillance systems in Indian Country. Compare the forms, noting the similarities and differences. Though each of these forms is different, they have all yielded data and results and have led to successful interventions.

Determining the Type of Surveillance System

There are several ways of setting up your surveillance system depending on the coverage needed, the objectives to be met, and the financial and human resources available. Most areas will use a Universal Surveillance System, but all of the systems are described below as they can be applied in some circumstances.[10]

- ***Universal Surveillance*: Most commonly used system and the one most likely to work for Indian Country.** The total number of cases occurring within a defined population is included in the system. This population-based surveillance accounts for all cases that occur. This is the preferred method of monitoring the occurrence of fatal injuries because rates of injuries and injury risk factors can be calculated and generalized to the population. Most surveillance in Indian Country is an attempt to capture all data. The methods below may be done as a follow-up to capture more data on specific injuries.
- ***Surveillance Based on Samples of Cases***: The information is obtained from a portion of the total number of cases or events. The sample must be representative so that inferences can be made regarding all possible cases occurring in the population. This method can be used to collect information about nonfatal injuries or as a follow-up to collect more data on specific injuries.
- ***Surveillance Based on a Review of Institutional Registries***: Institutional registries are reviewed periodically to analyze and identify variables of interest. When using this method, it is important to properly identify the institutions and the sources within institutions, such as clinical and emergency records, hospital discharges, or complaints filed with police or family welfare institutions. It is useful for monitoring specific injuries.
- ***Survey-Based Surveillance:*** Information is obtained through questionnaires focused on a specific topic, within a predefined period of time, and at predefined intervals. In the United States, for example, self-reported seat belt and safety seat use is measured at the state level by household surveys conducted for the Behavioral Risk Factor Surveillance System (BRFSS), by school-based surveys conducted for the Youth Risk Behavior Surveillance System (YRBSS), and by direct observation of passenger vehicle occupants for the National Occupant Protection Use Survey.

- ***Sentinel Surveillance*:** One or more institutions are chosen to monitor trends, target surveillance activities, and suggest preventive interventions. In general, surveillance systems of this type are not representative of the population, but are useful for calling special attention to risk situations and thus fulfill a key function for injury prevention decision-making. One example of this type of surveillance is the approach taken by child death review teams, which gather and analyze data on the circumstances surrounding all causes of child deaths. Sentinel surveillance systems complement other sources of information for injury prevention.

Plans for Systematization, Maintenance and Data Security

If you don't have an electronic database set up, seek the assistance of a programmer, an epidemiologist or a statistician. Epi Info 2002 is free software available through the CDC. For an overview of the software and installation and use instructions, visit http://wwwn.cdc.gov/epiinfo/7/index.htm. Any paper records associated with the system – original data sources, forms, etc. -- need to be kept in locked storage if there are personal identifiers.

Data maintenance should focus on the following:

- Reducing errors that may be introduced through flaws in the design.
- Improving the system's scope and services through routine maintenance, emergency maintenance and requests for special reports. The frequency and extent of maintenance should be based on your needs and resources. Consider some of the following:
    - Backing up data and system files according to an established schedule.
    - Maintaining records in a secure environment
    - Requiring requests for emergency maintenance to be in writing and entered into a log
    - Assigning priorities for special requests on the basis of urgency of need and time and resources required for fulfillment
    - Institutionalizing routine maintenance
    - Documenting maintenance that is conducted
- Safeguarding your system. This should be based on your needs and resources.
    - Consider limiting access to one person.
    - Consider installing the database on two computers. A primary computer and one reserved for testing changes to the system. The second computer can also serve as a backup in case the first one fails. Remember that changes need to be transferred from one computer to the other once the changes are tested and approved.
    - Consider keeping a second copy of the database off site. If you do this, remember routine updates of the offsite copy must be done.

Threats to a database

There are many things that could compromise your database. Below are just a few to guard against.

- Human error
- Mechanical failure
- Malicious damage

- Cyber crime
- Invasion of privacy
- Computer viruses[11]

Protocol

Successful surveillance systems will have clearly written protocol. In Appendix 8 you will find a number of examples from Indian Country. The protocol for your system will vary with your needs, but it should include the following:

- The procedures for obtaining and securing data
- Maintenance procedures
- Rules for data storage
- Rules for password protection and passwords
- Documents that detail all changes to the system, including maintenance, changes to the data collection instrument, case definition, etc.[12]

Exercise 4

Turn to Appendix 8 of this manual where there are examples of various protocols for surveillance systems in Indian Country. Compare the different protocols. What do similarities do you notice? What differences? There is no right or wrong way to write a protocol it depends on the needs.

Define Necessary Staff and Key Positions

Ideally a surveillance system will have a core staff, both part time and full time, that would include a program manager, a data manager, a research analyst and a coordinator. This is seldom if ever possible in Indian Country. In Indian Country it is more likely that your staff will consist of one or two people who will fulfill all of the functions of the system. You should also consider and plan for any training that may be necessary for staff to fulfill the tasks necessary. Some of the key staff functions and skill sets include:

- Coordinate system activities
- Establish contact with data sources and stakeholders
- Data entry
- Quality control
- Analysis
- Preparation of reports

Advisory Board/Coalition/Relationships

Just as with coalitions mentioned in the previous section, an advisory board could be helpful for offering technical advice, strategic planning and support for the surveillance system, but the reality is that often you will be working with just a few people. Within the IHS, sometimes district or area IP staff can fill some of the functions of an advisory board. A Tribal Health Director or a Tribal Epidemiologist can assist you as well by providing information or answering specific questions. This may be more realistic than an advisory board or coalition. Whether your advisors are a board or just a few people, it may be necessary from time to time to seek a group's or an individual's assistance with the following:

- Obtaining the data necessary for the injury surveillance system
- Review and advice on policy and procedures for data collection, linkage, publications, and mechanisms for implementing a reporting system
- Identifying the best use of data
- Strategizing about how to remove obstacles and inefficiencies
- Providing speaking opportunities with professional organizations
- Obtaining data sharing agreements
- Showing broad, high-level support for the system
- Getting local approval to start a surveillance system
- Navigating Tribal politics or resistance to surveillance, data collection or data sharing

Summary

Now that you've completed this section you should be able to:

- Define the injury events and data elements to be included in the system
- Develop the data collection instrument and determine data collection frequency
- Plan for systemization, maintenance and data security
- Define the functions and skill sets for key positions in your surveillance system

Resources & References

Resources

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[12] Ibid.

Section 5: Define and Develop an Analysis Plan for the Surveillance Data; Develop a Plan for Disseminating Results

Learning Objectives

- Calculate injury indicators such as frequency, percentages and crude, specific and adjusted rates
- Calculate Years of Potential Life Lost
- Describe the geographical analysis of the data
- Define a plan to disseminate and communicate the data

Introduction

In the previous section we discussed the collection of data. In this section we will talk about how to analyze data once it is collected. Data requires analysis. In this section we will discuss ways of analyzing data and how to disseminate the results of the analysis to policy-makers and the community.

Epidemiological Concepts and Terms

Below is a review of some epidemiological concepts and terms related to data analysis. You should be familiar with many of these terms from the IHS Level 2 Injury Prevention Course.

- ***Epidemiology*** as it applies to injury prevention is the study of trends and patterns of injury in a community – the who, what, when, where, why and how of injury. "The study of the distribution and determinants of health-related states or events in specified populations and the application of this study to control health problems." *A Dictionary of Epidemiology*
- ***Population-Based*** – Epidemiology is population based and concerned with the community not the individual. Some injuries, such as a shark attack, may get the headlines. But real numbers tell a different story. If IP efforts were based on headlines, you might fail to address the leading causes of injuries, such as MVCs, poisoning, falls, drowning or suffocation. Headlines, emotions and politics can and sometimes do influence injury prevention efforts, but utilizing data will help you discover the leading causes of injury and keep things in perspective.
- ***Injuries are not random.*** There are causes for injuries and ways to reduce them.
- ***Risk*** is the probability that an event will occur.
- ***Risk Factor*** is an attribute or exposure that could increase the probability of a specific outcome. A risk factor can sometimes be modified by an intervention, which would reduce the probability of the specific outcome. Some risk factors, such as age, sex, race and family history are often major determinants of risk. These types of risk factors cannot be changed. Other risk factors,

such as seat belt use, drinking and driving, personal protective equipment can be modified to reduce risk.

- ***Endemic vs. Epidemic.*** Something that is endemic is present in a community at all times but in relatively low frequency. Something that is endemic is typically restricted or peculiar to a locality or region. An epidemic is a sudden severe outbreak within a region or a group.

Data Analysis: General Guidelines and Terms

What does it mean to analyze something? Below are some definitions.

- Separate into elements or constituent parts
- Separate the parts of the whole so as to reveal their relation to it and to one another
- Examine critically or methodically

There is no set formula, rule or methodology for analyzing surveillance data. Analysis is as much an art as it is a science. Below are some recommendations for analyzing surveillance data.

Some things to keep in mind when analyzing your data:

- It may be tempting to immediately examine trends over time. But gaining an intimate knowledge of the day-to-day strengths and weakness of the data collection method and the reporting process can provide a better sense of the trends that emerge.
- Start with simple frequencies or counts of data variables. Begin with questions, such as: How many events were reported by week, month or year? How many events were reported by sex? How many cases were reported by age group? Look for patterns or clusters, the unusual or the unexpected. Progress to more complex analysis as may be necessary.

Basic rules:

- Indicate “N” (number of data items in the data set) or “n” (number of items in the data subset)
- Small numbers do not mean “bad” results … you simply need to acknowledge the N upfront.

Two common misconceptions about data analysis:

- The computer does not think for you. It does the counting, but you have to interpret what the numbers mean.
- A correlation does not necessarily imply a causation.

Basic Statistics

Analysis involves basic statistics (the counting) and interpretation (what does it mean). There are numerous ways to analyze data. The level of analysis will depend on what you are trying to determine from the data (e.g. descriptive study, grants evaluation) and your technical abilities to analyze the data. You don’t need to be a statistician to utilize basic statistics to help you better describe and understand injury data. Below are some basic data analysis methods that you can use.

***Numeric Value* –** Simply presenting the numeric value of a data variable is one data analysis method. Data from an injury surveillance system provides information about the number of cases in a given event. This method is very common and the information is easy to understand. Numeric value of one variable cannot be compared to that of the same variable in a different population. As a result, numeric values do not indicate risk.

Midpoint – Measure of central tendencies

- Mode − value that appears most often in a set of data
- Median – middle most number in a set of data
- Mean – the average

Proportional distribution – the percent of the total number of events in a data set which occurred in each of the categories (or subgroups) of that set. Percentages are commonly used and simple to calculate. For any given data set, the sum of all the values must equal 100 %. When data sets are small, percentages can be misleading and may not be an indicator of risk.

Basic Statistics – Rates

Calculating and analyzing rates are a critical part of your injury surveillance. It will help you formulate and test theories about causes and identify risk factors for injuries.

You've heard the expression, "comparing apples to oranges." The phrase applies to injury data analysis when you compare the number of deaths in different communities without considering the unique factors in each community that may account for the numbers, such as the size of the population or the volume of traffic. Rates are calculated to adjust for variations in exposure.

Rates are an expression of the frequency with which an event occurs in a defined population over a specific period converted to a whole number by multiplying by some power of 10 (usually 10,000 or 100,000).

The components of a rate are:

1. Numerator (the number of events in a specific time period)
2. Denominator (generally the population exposed: sometimes related to other expressions of exposure, such as traffic volume)
3. A power of ten

There are different kinds of rates based on the cases you use. An incidence rate, new cases in a defined period of time, is most commonly used in injury surveillance. Prevalence rates, new and existing cases, are less common in injury surveillance. Specific rates are based on the actual number of events in a sub-group of the population over a given period of time, such as the injury death rate for a specific age group in a community.

To determine the rate you need an accurate numerator and the appropriate denominator. The numerator will come from your surveillance data, the denominators are sometimes more difficult to obtain[1]. Denominators will often be an estimate. Below is the calculation for determining a rate for 100,000.

$$\frac{\textbf{Number of cases}}{\begin{array}{c}\textbf{Population at risk}\\ (\boldsymbol{same\ exposure\ period})\end{array}} \textbf{ x } \mathbf{10}^{\mathrm{n}} \textbf{ or } (\mathbf{K})$$

Your denominator can come from a number of sources, such as Tribal enrollment, U.S. Census data, traffic volume data or user population. Note that sometimes denominators are not people. For example if you're measuring plane crashes, the denominator may be landings and takeoffs. For motor vehicle crashes, it may be the number of vehicle miles traveled. It's best to consult a statistician or local injury prevention specialist if you're unsure about the appropriate denominator.

K is usually expressed as 10,000 or 100,000. Just as we multiply by 100 in determining percentages, we multiply by 10,000 or 100,000 in calculating rates.

It's important to remember that when you are calculating the rate for a multi-year period the population should be the combined period for each year. For example, the injury death rate for a community for a 3-year period, 2008-2010, is calculated as the number of cases in 2008 *plus* the number of cases in 2009 *plus* the number of cases in 2010 divided by the population in 2008 *plus* the population in 2009 *plus* the population in 2010 times K.

It's important to use common sense when selecting K. A small number of cases with small K may result in a fraction per K. That may not make sense to a lay person. On the other hand, expressing the rate using per 100,000 population may not make sense when presenting data on a population of 150 people.

Crude Rate

A crude rate is based on the actual number of events in a total population over a given period of time. Determining the crude rate is your first step, because information about a population must be obtained and compared.

Specific Rate

A specific rate is based on the actual number of events in a subgroup of a population over a given period of time. Sometimes the overall rate may not provide a clear picture of injury. For example, in the United States injury mortality rates are higher among men than women or greater among the AI/AN population than among whites. If only overall rates are calculated, you will not discover the variations and the magnitude of the problem in subgroups[2]. Awareness of such differences can guide the development of injury prevention programs among populations at the greatest risk. Table 1 on page 5-5 shows the specific rates of suicide for the AI/AN Population by Age Group[3]. Note where the highest number of deaths occurred.

Adjusted Rate

Adjusted rates are constructed to permit fair comparisons between groups differing in some important characteristic. For example: adjusted rates for the miscoding of Indian race or adjusted rates to account for variation in age among different populations (the large number of retirees in Florida or the large number of youth in AI/AN population). Calculating an adjusted rate is complicated. You can use CDC WISQARS for national and state level data, but for an adjusted rate on local data seek the assistance of a statistician or an epidemiologist.

Table 1: Specific Rates of Suicide for AI/AN Population by Age Group – 2010

Age Group	Suicide Deaths	Population	Crude Rate
0 to 4	0	393,726	0
5 to 9	0	377,904	0
10 to 14	14	372,896	3.75
15 to 19	70	393,320	17.8
20 to 24	88	362,892	24.25
25 to 29	51	340,576	14.97
30 to 34	49	311,098	15.75
35 to 39	37	292,412	12.65
40 to 44	38	280,013	13.57
45 to 49	45	283,889	15.85
50 to 54	32	253,858	12.61
55 to 59	20	197,306	10.14
60 to 64	8	148,434	5.39
65 to 69	6	97,909	6.13
70 to 74	5	66,019	7.57
75 to 79	2	43,090	4.64
80 to 84	3	26,959	11.13
85+	1	21,237	4.71
All Ages	469	4,263,538	11

Source: CDC WISQARS Fatal Injury Reports

Some general considerations for rates

- The numerator should be accurate
- The denominator is typically estimated
- The denominator isn't always population based. It could be some other indicator of exposure such as vehicle miles or work hours.
- Rates are primarily used to compare different groups (like communities) or different subgroups (like age groups within a community)
- Rates indicate the probability or risk of an event, such as an injury, occurring

Exercise

Rate Exercise (60 Minutes)

Answer as many of the questions on the handout as time allows. You'll need a calculator.

Years of Potential Life Lost (YPLL)

The burden of injury falls disproportionately on the young. It is important to consider how the deaths of so many young people affect the future of a community. The effect of this premature mortality is reflected in the measurement of YPLL.

YPLL measures the potential life lost for people between the ages of 1 and 65 at the time of death. The calculation is simple:

65 - Age at the time of death=YPLL.

For example, for a person who dies in a car crash at age 25 the YPLL is 40 (65-25 = 40). Use the life expectancy of your population. AI/AN populations have a shorter life expectancy than the general population. Note that if a person dies at an age greater than the life expectancy you're using, you ignore it. WISQARS allows for YPLL calculations for AI/AN population.

The table on the next page shows the YPLL in Indian Country for 2010 using age 65 as the base number. Note where injury ranks in comparison to other causes of death. In Indian Country, 66,612 years of potential life were lost because of unintentional and intentional injuries[4]. More potential years of life were lost because of injury than all the other seven identified causes of death combined.

Table 1. **Years of Potential Life Lost Before Age 65 American Indian/Alaska Native Population - 2010**

Cause of Death	YPLL	Percent
All Causes	167,928	100.0%
Unintentional Injury	**43,055**	**25.6%**
Suicide	**14,730**	**8.8%**
Heart Disease	14,689	8.7%
Malignant Neoplasms	14,524	8.6%
Liver Disease	11,290	6.7%
Homicide	**8,827**	**5.3%**
Perinatal Period	7,604	4.5%
Congenital Anomalies	7,209	4.3%
Diabetes Mellitus	4,307	2.6%
Influenza & Pneumonia	2,340	1.4%
All Others	39,353	23.4%

Source: CDC WISQARS YPPL Reports

Geographic Analysis of Data

Depicting data using maps is a valuable exercise that provides a clear and quick method for grasping data, particularly with people who are familiar with the geographic area. There are software packages that can create maps and WISQARS allows for mapping as well. Even if you do not have the software or the necessary equipment to produce a digital map, you can create a spot map by placing a pin on a printed map where each injury occurred.

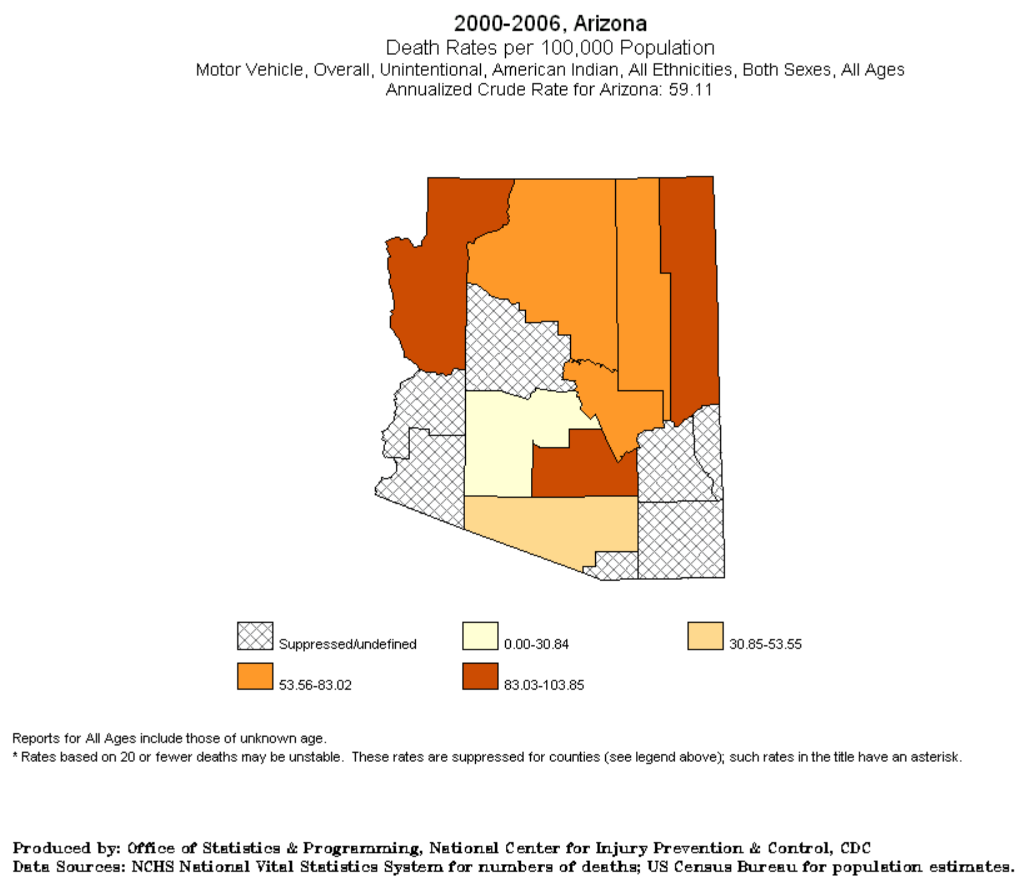
The following are some common types of mapping. [5]

- Spot Map: produced by placing a dot or other symbol on the map where an injury occurred. Different symbols can be used for multiple events at the same location. A spot map is useful for displaying the geographic distribution of an event, but it does not provide a measure of risk, since population size is not taken into account.

- Area or Choropleth Map: On an area or choropleth map regions are shaded or marked proportionally to the data being depicted. For example, population density or per capita income. Area maps are useful for depicting rates of injury in specific areas. The Figure 1 on page 5-8 is an example of an area or choropleth map generated using the CDC WISQARS map program.

- Pin or Cluster Map: This is a way of indicating road traffic hazards or crash prone locations along roads. Identifying "black spots" helps to pinpoint specific hazards that can often be corrected in a cost-effective manner.

Figure 1. **Example of a Choropleth Map**



Data Analysis Summary

- Epidemiology serves as a foundation
- There are many data analysis methods
- Rates are important
- You need to interpret results and explain what they mean
- Utilize available resources
- Communicate your findings

Plan to Disseminate and Communicate the Results

Surveillance can only achieve results if the information is communicated to the appropriate people or stakeholders. Effectively disseminated data can lead to support for continued data collection; prioritization of injury interventions; implementation of interventions; and visibility for the problem of injury and your program.

Below are some steps to take in developing a dissemination plan.

- Determining who will get the information will depend on your location. Depending on where you are it could be members of your coalition in addition to decision makers at the tribal, village government, state or national level. It's also important to get information to the organizations or agencies that provide services so they can tailor their services to address the issues presented by the data.
- Check with each tribe within your surveillance system regarding the review and approval of your plans to publicize the information you've collected.
- Develop the message. This is where the interpretation aspect of analysis is very important. You need to give context to the information, not just numbers. Be aware that low numbers can skew things up or down, even when you're well within standard deviation.
- Select the format for presenting the information. Different audiences may require different formats. Use an appealing format. Use plain language the public would understand. Keep it simple, provide only the most important facts.
- Some format considerations
    - Summary vs. detailed
    - Narrative graphs
    - How often the material will be produced and how it will distributed
    - Electronic or paper
    - Web based
- Market the message
- Evaluate the impact

Surveillance system report

A surveillance system report is a means to convey the results of the surveillance system to all the stakeholders.[6] Consider the needs of the stakeholders when making decisions about design and frequency of your report. The specifics may vary depending on your location, but here are some things to consider including in an injury surveillance system report:

- Introduction: Offer a brief description of the injury surveillance system, the purpose, related prevention activities and the objective of the report
- Leading causes of death, frequency and proportion and rank of injuries among all causes
- Leading causes of injury mortality, frequency, proportions, and crude rates, emphasizing the highest indicators
- Leading causes of injury morbidity if the information is available
- YPLL
- Cost of injuries, comparing local data if available
- Priority injuries identified in the region, summarizing those with the highest number, percentage, rates, costs and YPLL
- Recommendations for prevention strategies. This is an important step because it helps stakeholders decide what actions to take. Sometimes the analysis of local data presents a

specific local problem with a specific local solution. An example is a nighttime pedestrian crash cluster at a specific location which can be solved by the installation of streetlights. When more general problems are identified (e.g. lack of seat belt use), the Guide to Community Preventive Services (Community Guide) or other sources of effective prevention strategies may be referenced for the most effective ways to address the identified problems.

When disseminating your report, consider the groups below:

- Stakeholders, decision makers, law enforcement, public health directors, school officials, etc.
- Hospital, emergency departments, health clinics
- Health professionals in the scientific community
- Scientific/academic researchers
- Grassroots organizations
- Data sources

You will also need to consider how best to deliver your report. In some cases, the delivery method you choose will depend on the audience you are trying to reach. Below are a number of options for disseminating your report or the information in it.

- Health department newsletters
- Tribal meetings
- Home by home
- PSAs
- Press releases
- Flyers
- Periodicals/annual reports
- Presentations
- Newspapers
- Websites
- Schools

Exercise

Optional Discussion: Consider and discuss these questions.

- Which information is most important to present to stakeholders?
- Which indicators would best show the size of the problem?
- Do you think cost data is important to stakeholders?
- Should you include recommendations about prevention strategies in your surveillance report?

Summary

Now that you've completed this section you should be able to

- Calculate injury indicators such as frequency, percentages and crude, specific and adjusted rates
- Calculate Years of Potential Life Lost
- Describe the geographical analysis of the data
- Define a plan to disseminate and communicate the data

Resources & References

Resources

Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS) [online]. (2005) [cited 2013]. Available from URL:www.cdc.gov/ncipc/wisqars

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References

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[3] Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS) [online]. (2005) [cited 2013 February 14]. Available from URL:www.cdc.gov/ncipc/wisqars

[4] Ibid.

[5] Barss P, Smith G, Baker S, Mohan D. *Injury Prevention: An International Perspective (Epidemiology, Surveillance and Policy).* New York, NY: Oxford University Press; 1998.

[6] Holder Y, Peden M, Krug E, Luna J, Gururaj G, Kobusingye O, eds. *Injury Surveillance Guidelines*. Geneva: World Health Organization; 2001.

Section 6: Use Surveillance Data to Inform Injury Prevention

Learning Objectives

- Understand the use of surveillance data to identify priority injuries in your region
- Understand the models that can help identify risk factors and intervention strategies
- Understand the models that can help identify the most appropriate intervention for your community
- Tie surveillance to action and funding

Introduction

There are many reasons for developing an injury surveillance system. Surveillance is not done for surveillance's sake. The data collected can be used to help paint a picture of the injury problem in the population you are observing. It can help you determine the magnitude and severity of injury events, the trend of injury events over time or place and the cost of injury, both financially and in terms of life lost. In short it can help you establish injury priorities.[1]

Once you have identified the injury priorities you should define some strategies to prevent them. In this section we will talk about ways to identify injury priorities, identify the causal factors for these injury priorities and tie injury surveillance to action and funding.

Use of Surveillance Data

Establishing injury priorities is one of the main reasons for gathering injury data. To define injury priorities you need to determine a number of factors, such as the magnitude of the problem, the cost in terms of life lost or disabilities, and the direct and indirect financial costs. [2] [3] [4]

We look at the severity and magnitude of injuries because it's important that prevention efforts focus on the problems that have the most devastating impacts. There are limited funds and human resources to devote to injury prevention and it's impossible to address every injury. Prevention efforts should be focused on those injuries that are most costly to the Tribe or community and that have the most severe impact on the quality of life for the victim or community. Surveillance data can assist you in making these determinations.

Some other uses of surveillance data include:

- Provide perspective on headlines and injuries that may be getting a lot of attention, but may not warrant intervention based on the number of people affected.

- Help you determine the trend of injury events over time, which can help point to injuries that are increasing in frequency and may need to be addressed.

- Help you inform local, regional and national authorities, organizations and the public about the magnitude of an injury problem, which could lead to support for prevention efforts.

You don't have to engage in an overwhelming surveillance effort in order to gather enough data to begin prevention. It's not necessary to know everything about injuries in your community. Start small, focusing your data collection efforts on what you can reasonably achieve. **You can work on prevention activities without knowing everything about an injury problem or just using the data you have available.**

Criteria to Prioritize Injury Events

How should you determine an injury priority? The equations below offer you some insight on how to determine which events are a high priority and which events should be low priorities. The criteria is based on the Event Importance (magnitude, severity, trend and cost) and the Prevention Control Capacity (possibilities for controlling the event and the interest among local and regional groups for controlling the event).

High Importance + good Control and Prevention Capacity = **High Priority for Prevention and Control**
High Importance + low Control and Prevention Capacity = **High Priority for Research**
Low Importance + good Control and Prevention Capacity = **Low Priority for Prevention and Control**
Low Importance + low Control and Prevention Capacity = **Not a Priority**

To following information will help you in applying the criteria.

1. General Information
   - Leading causes of death
   - Number, proportion, and crude and adjusted rates
   - YPLL from injuries by intention
   - Trend of injuries over a minimum of five years
2. Specific Information
   - Homicide: crude and specific rates by age group and sex and mechanism
   - Motor vehicle related deaths: crude and specific rates by age group, sex and road user (pedestrian, vehicle occupant, motorcyclist or cyclist)
   - Leading causes of injury morbidity: crude rates by age group, sex and nature of injury, lethality rate, admission rate and disability
2. Costs
   - Direct costs expended for patient care
   - Indirect costs
   - Economic and human costs
3. Disability Adjusted Life Years (if available)
4. Information on activities to control injuries at local, regional and national levels.
5. Control possibilities or vulnerability – This refers to the potential to implement a program with existing resources. Problems that can be controlled easily with less cost,

should be assigned a higher priority than those where control or prevention would be more difficult or expensive.

Identify and Select Potential Interventions to Prevent Priority Injuries

The Haddon Matrix and Ecological Models, which were described briefly in Section 1 and in more detail in the Appendix, can be used to help you organize and prioritize causal factors for priority injuries.

The Haddon Matrix

The Haddon Matrix is used both to conceptualize causal factors and to identify potential prevention strategies. The Haddon Matrix is built using columns and rows. In the columns, Haddon identifies – host, agent and environment (brief description of each). In the rows he identifies phases of the event – pre-event, event and post event. By filling in the cells of the matrix, one can identify a range of potential risk factors. You can then use the matrix to address the risk factors by filling in the cells with strategies or ideas for prevention that are directed at each of the factors (columns) and that have an influence on each of the phases (rows).[5] An example of the matrix used in this way can be found in Appendix 10.

The Ecological Model for Violence-Related Injuries

Ecological model helps to identify and organize the multiple levels of influence that affect behavior. Violence is considered the product of the interaction between these multiple levels. The strength of the model is its ability to distinguish among the multitude of influences on violence while providing a framework for understanding the interaction. To use the Ecological Model to identify causal behavior and intervention strategies consider potential interventions aimed at each level as defined below:

- Individual. The first level of the model focuses on the characteristics of the individual that increase the likelihood of being a perpetrator or victim.
- Relationship. The second level explores relationships, such as relationship with peers, intimate partner or family, that can increase the risk of violence.
- Community. The third level of the model examines the community in which the relationships are embedded.
- Society. The final level examines the societal factors that influence behavior.[6]

An example of this model used to identify risk factors and interventions is in Appendix 10.

Decision Matrix

The Intervention Decision Matrix[7] is a tool designed to help people Identify and choose among the intervention options. This tool is applied after the priority injury problem has been identified. There are five elements to consider: Effectiveness; Cost; Sustainability; Social and Political Acceptability; and Possible Unintended Consequences . Each element is given a score from 1 to 3. The sum of the score will help you rate your intervention options. (See example in Appendix 10.)

Tie Surveillance to Action and Funding

The ultimate goal for your surveillance effort is action in the form of injury prevention, policy changes, improved data collection and funding to support your prevention efforts. There is no particular “recipe” to translate data to action. Much will depend on your community and your resources.

Exercise

Discuss your experiences where data has translated to action or funding. Consider the following:

- Improved data systems
- Policy changes
- Funding through grants
- Interventions (e.g., highway safety improvements)

Summary

Now that you've completed this section you should:

- Understand the use of surveillance data to identify priority injuries.
- Understand models that help identify causal factors and intervention strategies for priority injuries.
- Understand the models for identifying the most appropriate interventions for the injuries in your Tribe or community.
- Understand how to tie surveillance to action and funding.

Notes

Resources & References

Resources

Espitia-Hardeman V, Paulozzi L. *Injury Surveillance Training Manual*. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control; 2005.

References

[1] Barss P, Smith G, Baker S, Mohan D. *Injury Prevention: An International Perspective (Epidemiology, Surveillance and Policy).* New York, NY: Oxford University Press; 1998.

[2] Stroup D, Teutsch S. Statistics in public health. Quantitative Approaches to public health problems. New York, NY: Oxford University Press; 1998.

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Section 7: Define an Evaluation Plan for your Surveillance System and Monitor Prevention Activities

Learning Objectives

- Know the steps to evaluating an injury surveillance system
- Use surveillance data to monitor prevention activities

Introduction

Surveillance systems should meet their objectives as efficiently as possible. For this reason it is necessary to obtain continuous feedback on the operation of the system. The CDC has published the Guidelines for Evaluating Surveillance Systems. These guidelines were updated in 2001 and published in the MMWR[1]. In this objective we will discuss some of the steps outlined in those guidelines.

Evaluation Process[2]

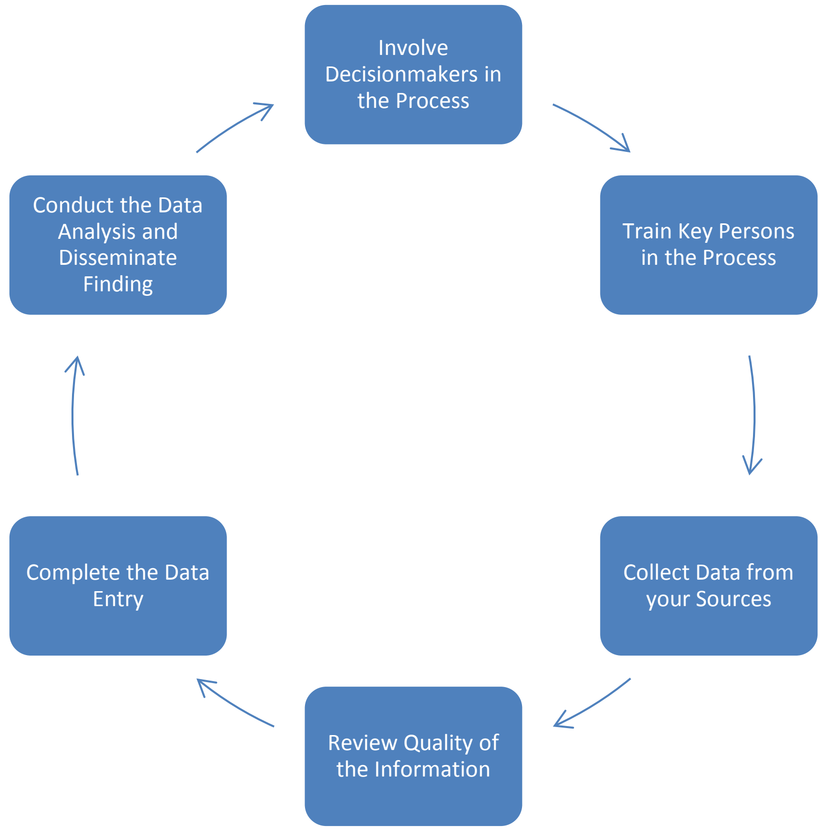
Engage stakeholders in the evaluation

It would ideal to engage the stakeholders in evaluating the systems, but it may not always be practical. Coalition members, if you were able to establish one, and other stakeholders may be a source of feedback on the systems. Officials, public health workers and officers, media and others in the affected communities can provide input to ensure that the evaluation of the surveillance system addresses the appropriate questions and that the findings will be useful.

Describe the surveillance system to be evaluated

In this step you describe the process—the flow of activity in your surveillance system. It's not where you evaluate the data you're getting from the system. Figure 1 on the next page is an example of the flow of activity for a surveillance system.

Figure 1: Example of a Flow of Activity for a Surveillance System



Determine a process for evaluation

Circumstances and resources will determine how you want to proceed with the evaluation of your system. You could do a process analysis of the system, looking at each step and evaluating its effectiveness. Or you could do quality assurance, looking at the data that's been inputted into the system and determining the quality of it.

As you're evaluating the system, ask if the system is working the way you intended it to work and is it giving you the information you need. If not, you might look into a preliminary evaluation based on the factors below. If you are a one- or two-person operation, it is much better to devote your time to building and operating the system than to evaluating it. If the system is not giving you the information you need or intended you should seek the assistance of the technical advisor or technical resource.

Factors to consider when evaluating your system

- Simplicity. This refers to the structure of the system and the ease of operation. Surveillance systems should be as simple as possible while still meeting the needs of their objectives.
- Flexibility. A flexible surveillance system can adapt to changing information needs and can accommodate changes in case definitions or technology and variations in funding or reporting sources.

- Data Quality. This reflects the completeness and validity of the data recorded in the public health system. Examining the percentage of “unknown” or blank responses to items is an easy measure of the data quality. Data of high quality will have a low percentage of blanks or unknowns.
- Acceptability. This is the measure of how willing other organizations are to participate in the system.
- Timeliness. Measures the speed at which information travels through the system. It’s usually the amount of time between the onset of an event and the reporting of the event to the public health agency or group that is responsible for instituting control and prevention measures. The need for a rapid response in a surveillance systems depends on the event being measured and the objectives of the system. The use of electronic data collection from reporting sources via the internet and the increased use of electronic data interchange by surveillance systems helps promote timeliness.
- Stability. This measures the ability to collect, manage and provide data properly on a regular basis without fail. Data needs to be collected over a long period of time in order to provide opportunity for analysis.
- Sensitivity. This measure can refer to two things. One is the level of the proportion of cases detected by the surveillance system. Second, sensitivity can refer to the ability of the system to detect outbreaks or monitor changes over time.
- Representativeness. A surveillance system that has good representativeness accurately describes the occurrence of an injury event over time and its distribution in the population by person and place.

It’s very important to communicate your findings to the appropriate people. Gather your thoughts about any problems you have discovered about the system and talk to the people involved about whether to fix problems.

It’s also important to keep notes about any changes you make to the system and whether those changes may impact data and how. For example, when you have a new focus, such as suicide plus drugs, or you have new people or you switch from ICD 9 to ICD 10, you should note these things in a file you have earmarked just for documenting changes to the system.

Use Surveillance Data to Monitor Prevention Activities

In this step you are tracking data, not trying to prove cause and effect. The bullet points below are just an informal evaluation. But it’s important to be aware that other contributing factors may have influenced the outcome or if changes in the system/investments are the reason for the difference.

- Monitor the association of the implementation of the prevention strategies with changes in the number, rate and characteristics of injury, which allows decision-makers to decide whether or not to continue prevention activities.
- Monitor changes in the trend of an event before and after a strategy is applied.
- Monitor the impact of strategies applied for purposes other than injury prevention that could positively or negatively affect the events under surveillance.
- Possible over- or under-representation of certain groups in the population.

- Possible over- or under presence of some types of events in areas of the region

Summary

Now that you've completed Section 7 you should:

- Know the steps to evaluating an injury surveillance system
- Be able to use surveillance to monitor prevention activities

Final Exercise

Design a Surveillance System (2-3 hours): This last exercise of the course is designed to tie in all the concepts that have been discussed over the last three days. Design a system and write a brief protocol based on the scenario that was assigned you at the beginning of the course. Be sure to addresses the following:

- Possible data sources
- Steps necessary to gain access to data
- Case definition
- Variables
- Primary data collection form
- Use of supplemental data collection form
- Frequency of data collection
- Frequency and recipients of surveillance system reports
- System security
- Confidentiality issues

Consider the potential challenge you could face and people or organizations that could assist you in overcoming challenges. Consider the feasibility of the systems and what limitations (staff or money) you might have to deal with.

Conclusion

Congratulations! You have now completed *Designing and Implementing Injury Surveillance Systems in Indian Country.*

Over the last several days you have covered many topics and should have mastered the objectives outlined below.

1. Understand the conceptual framework of injury prevention
    - Understand the concepts, definitions and classification of injuries

- Know the difference between violence related injuries and unintentional injuries
- Describe the burden and cost of injuries
- Know the conceptual models for understanding and preventing injury
- Know the steps to develop an injury surveillance system
- Review the ethical considerations

2. Assess injury data sources and describe the injury problem
    - Identify the injury data source strength and weakness
    - Identify the available data sources that can provide information to the surveillance system
    - Describe the size of the injury problem
    - Compare the frequency of injuries calculated with the data from different sources
3. Build a coalition to support the injury surveillance system and prevention activities
    - Identify and recruit partners to include in the coalition
    - Identify local and national organizations working on injury prevention in the region
    - Define the existing social, legal and political framework in which an injury surveillance system and prevention activities may be established
4. Determine the appropriate methodology for the surveillance system
    - Define the injury events and data elements to be included in the system
    - Define objectives
    - Develop the data collection instrument and determine the data collection frequency
    - Perform validation
    - Re-evaluate objectives
    - Plan for systemization, maintenance and data security
    - Define key positions
5. Define and develop an analysis plan for the surveillance data
    - Calculate injury indicators such as frequency, percentage, and crude, specific and adjusted rates
    - Calculate years of potential life lost
    - Describe the geographical analysis of the data
    - Define a plan to disseminate and communicate data
6. Use injury surveillance data to inform injury prevention
    - Using surveillance data to identify injuries in your region
    - Identify potential causal factors of injuries
    - Tie surveillance to action and funding
7. Define an evaluation plan for the surveillance system and monitor prevention activities
    - Know the steps to evaluating an injury surveillance system
    - Use surveillance data to monitor prevention activities
8. Design and Implement an Injury Surveillance System in Indian Country.

Resources & References

Resources

Espitia-Hardeman V, Paulozzi L. *Injury Surveillance Training Manual*. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control; 2005.

References

[1] Centers for Disease Control and Prevention. Updated guidelines for evaluating public health surveillance systems: recommendations from the guidelines working group. *Morbidity and Mortality Weekly Report* (*MMWR*). 2001; 50(RR13).

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Injury Surveillance
Bristol Bay Area Health Corporation
Environmental Health Injury Prevention Program

I. Track trooper press releases, news stories and public knowledge for serious injuries especially injury death
  A. Complete surveillance sheet for each injury

II. Monthly review ER Log for injury
  A. Complete surveillance sheet for each injury
  B. Complete medical record request and review record for each injury that circumstances and mechanism of injury are not readily apparent

III. Refer any visits that may be associated with behavioral problems to Behavioral Health for review (ie. <21 ETOH, suicide ideation, etc.)

IV. Refer any dog bites not properly reported to Environmental Health personnel

V. Complete Level IV report
  A. Refer most severe/complicated trauma case for month to Level IV committee for review

VI. Place death, medevac, hospital admits, ambulance or air transports and dog bites in Epi Info. Database

VII. Quarterly complete Performance Improvement report for Injury Prevention/Level IV

VIII. Share, generate reports, plan programs, publicize, support grants, evaluate, etc. (with in the bounds of HIPPA mandated confidentiality)

IX. ASAP after FY end, prepare latest 5yr. graphs of injury and alcohol involvement for informational and publicity purposes *(added 7/27/10)*

Injury Surveillance

Ward Jones, Injury Prevention Specialist

Ward Jones, Injury Prevention Specialist

Bristol Bay Area Health Corporation
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Goals

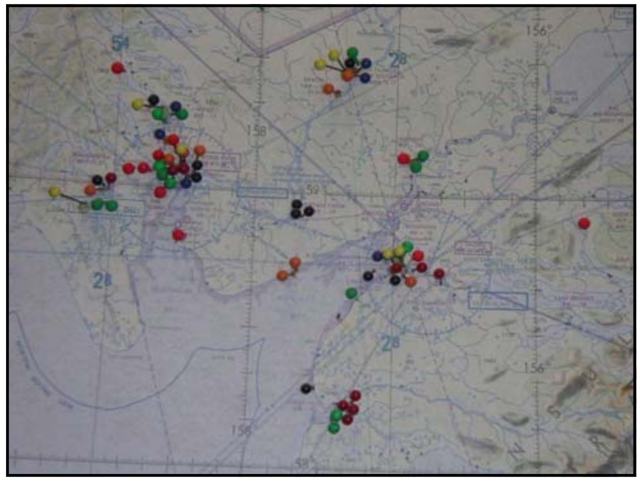
- Understanding a simple surveillance system.
- It's uses and benefits.
- Application to transportation safety.

BBAHC System

- History
- Content
- Operation
- Uses and benefits (with examples)
- Cautions and pitfalls

BBAHC System

- Began Federal FY 93
- Currently Contains 19 Yr. by FY
- 5,332 individual entries
- Including 290 deaths



The Particulars

- Formal System with policy (departmental)
- Monthly check ER Log
- Data Input (Epi. Info 6)
- Data Sources

Computers

Individual Record Form

- Form included in packet

Do it yourself

Medical Record Number: ________________

Bristol Bay Area Health Corporation
Injury Prevention Program
Severe Injury Surveillance Data

Date of Injury:

Community where Injury Occurred:		Community of Residence:	

Alcohol Involved: Yes No

Nature of Injury:

Race: Sex: Male Female Age:

Severity of Injury:

How it Happened:

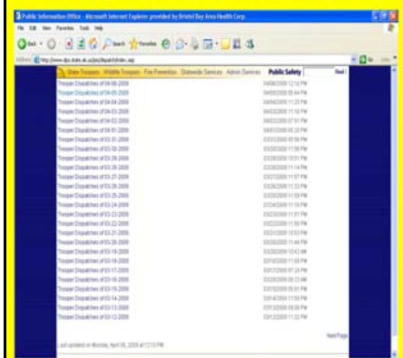
Narrative: ________________

Sources (including but not limited to)

- Kanakanak Hospital ER Log
- (Medical Records if needed)
- *Alaska State Troopers
- VPSO
- Police
- EMS
- NIOSH *statute
- AK Dept. Epi. *statute

Confidentiality and professionalism

www.dps.state.ak.us/pio/dispatch/index.asp



*Note Saves

Uses and Benefits

- Identify Problems
- Prioritize
- Identify Solutions (3Es & not just own ideas)
- Evaluation
- Information sharing and support (confidentiality/HIPAA)

Aleknagik Road Project

Information Examples

$700 K

- Suicide Prevention

- Level 4 Trauma

Recommendations

- Keep it simple
- Formal
- Consistent
- **At least do a pin map**

The Application of Local Injury Surveillance Data: A Streetlight Intervention Project to Reduce Pedestrian Injury at an American Indian Reservation.

Jon S. Peabody and Richard J. Smith III, U.S. Public Health Service, Indian Health Service, USA.

Introduction

High unintentional injury morbidity and mortality affecting American Indians and Alaska Natives (AI/AN).

Emphasis in Indian Health Service (IHS) to establish local injury surveillance systems at AI/AN communities.

Intent of surveillance systems:

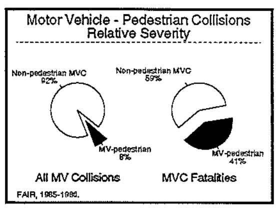
- basic descriptive epidemiology of injuries,
- design targeted prevention/intervention efforts,
- evaluation purposes.

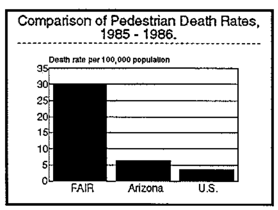
Purpose

Injury surveillance system established at a Reservation in the southwestern U.S.

Analysis of the first 2 years of data revealed a problem involving motor vehicle-pedestrian (MV-Ped) injury:

- 32 total MV-Ped collisions:
  - 7 fatalities,
  - 17 hospitalizations.





- Of all MV-Ped collisions:
  - 72% occurred at night,
  - 63% involved alcohol,
  - 32% clustered along a 1.1 mile (1.77 km) section of highway.

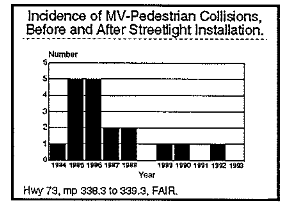
Method

Pedestrian injury data were used to justify a project to install 28 streetlights along the 1.1 mile (1.77 km) cluster section of highway.

The streetlight installation was a collaborative project involving 4 different agencies:

- the Tribe,
- the IHS,
- the state transportation department,
- the local electric utility.

Results



Project evaluation:

- 5 years before installation of streetlights to 5 years after installation,
- compared intervention section of highway to 2 adjacent non-intervention sections of highway.

Data sources:

- MV crash data,
- Traffic volume data,
- Injury surveillance data,
- Death certificates.

Multiple regression test used.

Regression variables included:

- highway section,
- collision type,
- pre- or post-intervention,
- day or night,
- streetlight present or absent,
- liquor present or absent,
- average daily traffic volume.

Significant reduction in pedestrian collisions related to streetlights ($p < .01$).

Conclusions

Project evaluation indicated a successful injury intervention project.

Success in using local injury surveillance data to justify an intervention project, and in establishing administrative process to do project, has prompted similar projects elsewhere in Indian country.

Project implications:

- identification of community-specific data,
- support to community coalitions or committees,
- targeted intervention design,
- estimation of cost-effectiveness.

An Evaluation of the Livestock Control Program on the Fort Apache Indian Reservation.

Hayden Anderson, Health Education Department, White Mountain Apache Tribe

Introduction

High injury morbidity and mortality affecting Native Americans.

MVCs a particular problem on FAIR, especially MV-livestock.

1985-86 data indicated 14% of MVCs on FAIR involved collision with livestock.

Existing livestock control ordinance, but enforcement inconsistent and ineffective.

Tribal Health Education Department interest in issue led to public opinion survey:

- 93% of respondents believed livestock on highways to be a safety hazard,
- 94% of respondents supported enforcement of livestock control ordinance.

Tribal Council meeting and action.

Implementation of current livestock control program in August 1991.

Method

Study developed to evaluate the effectiveness of livestock control program.

Six-year study period - January 1989 to December 1994.

Study parameters:

- before and after program implementation,
- MV-livestock collisions or non-MV-livestock collisions,
- traffic volume,
- crash rates per million vehicle miles,
- chi square test.

Data sources:

- Tribal police crash records,
- Arizona Department of Transportation traffic volume data,
- livestock control program records.

Results

After program implementation, 863 livestock removed from highway rights-of-way and impounded.

Pre-intervention - 16% of MVCs involved collision with livestock.

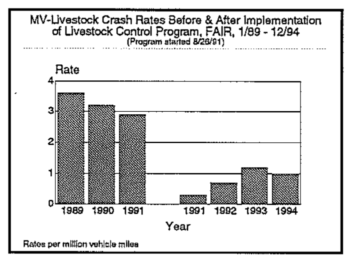
Post-intervention - 4% of MVCs involved collision with livestock.

Crash Rates Before and After Implementation, Livestock Control Program, FAIR, 1/89 - 12/94.

	Before	After
Rate of Non-MV-Livestock Crashes	2.44	2.25
Rate of MV-Livestock Crashes	0.314	0.090

Rates per million vehicle miles

Significant reduction in MV-livestock collisions (p<.00001).



Conclusions

Study evaluation indicated a successful injury intervention program.

Exellent example of a targeted intervention based on a locally identified and defined problem.

Key components that contributed to the success of this intervention:

- Leadership: active involvement of interested community member/Tribal employee,
- Public support: overwhelming concern by public about problem identified through public opinion survey,
- Political support: Tribal Council acknowledged problem and public concern, convened special council meeting, and took action to implement livestock control program,
- Media coverage: Positive media coverage of identified problem and public opinion survey findings in local newspaper and radio station, and in state-wide newspaper.

Highway 70 Widening/Channelization Project

A. Dellapenna, S. Inserra, J. Peabody, and K. Hicks, Phoenix Area Indian Health Service

INTRODUCTION

High injury morbidity and mortality affecting Native Americans.

In Phoenix Area IHS in early 1980's, injury was second leading cause of death.

On this Reservation in early 1980's, MVC was 3rd leading injury type.

However, of all injury types, on this Reservation, MVC was:

- #1 for injury and fatality,
- #1 for ALOS, and
- #1 for treatment costs.

Initial review of police records indicated that almost half of all MVCs on this Reservation occurred on Highway 70.

Highway 70 is the major Reservation highway, and receives local, tourist, and commercial vehicle traffic.

Highway 70 under State DOT maintenance jurisdiction.

Major housing construction program initiated in early 1980's.

METHOD

Initial descriptive study of MVCs on Highway 70 for 3-year period, 1985-1987.

Data sources:

- Tribal police MVC records,
- State DOT crash records,
- IHS Hospital ER records,
- Tribal EMS records.

Second descriptive study of MVCs on Highway 70 for 2-year period, 1988-1989.

Second study used same design as first study.

Data from both studies provided a 5-year epidemiologic description of MVCs on Highway 70.

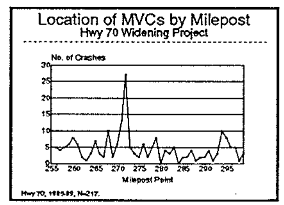
RESULTS

Data summary for Highway 70 for time period 1985 to 1989:

- 217 total MVCs,
- 183 MVC-related injuries,
- 14 MVC-related fatalities.

Two major findings:

1) High incidence of MVCs at one location, specifically at intersection at milepost 272.5.



2) Rear-end collisions were the predominant crash type at this intersection. Most rear-end collisions involved through traffic colliding with:

- vehicles pulling onto the highway from a side street, or

- vehicles slowing down on the highway to turn onto a side street.

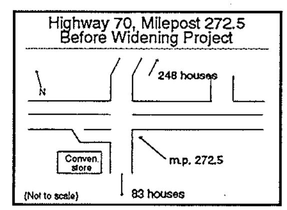
DISCUSSION

Since 1980, 331 houses were built in housing areas that feed into this intersection.

No highway design changes were made to accomodate these demographic changes.

In other words, the traffic patterns and usage at this intersection assumed urban characteristics, while the highway retained its rural design.

In addition, topographic features created some sight distance problems.



Active involvement by Tribal Councilman:

- initiated and maintained continued dialogue with State DOT,
- voiced citizens' concerns,
- cited problems and data from the MVC studies.
- interest and action led to widening project.

CONCLUSIONS

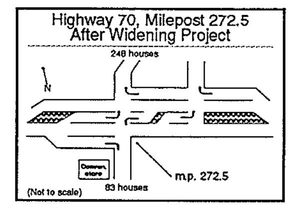
Widening or channelization project completd by State DOT:

- included left-turn, right-turn, and through lanes for traffic from either direction,

- involved removal of topographic obstructions,

- involved 0.4 miles of highway at cost of $ 315,000,

- completed in 1991.



Excellent example of targeted intervention based on locally identified and defined problem.

Excellent example of importance of active involvement of Tribe or Tribal leadership.

Formal evaluation necessary to verify if project was successful in reducing MVCs at this intersection.

A Retrospective Case-Control Study of Porch Step Falls Occurring on the Fort Apache Indian Reservation, 1987 - 1989.

Gina L. Locklear, Phoenix Area Indian Health Service

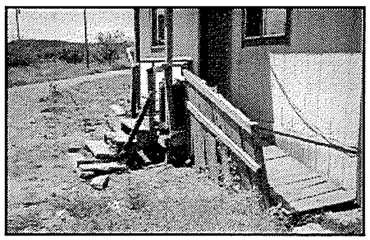
Introduction

Fall injury a serious problem on the Fort Apache Indian Reservation (FAIR), 1987-1989:

- 3rd leading cause of injury hospitalization,
- 2nd most costly type of injury.

Fall injury data for FAIR, 1987-1989:

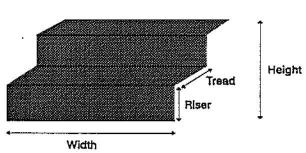
- porch steps 2nd most common fall location,
- hyposthesized environmental influence with porch step falls.



This study was conducted to:

1) epidemiologically characterize porch step falls, and
2) define physiological and environmental factors contributing to these falls.

Step Terminology



Methods

Case identification from local IHS injury surveillance system:

- fall from porch steps,
- occurred from 1987 to 1989.

Control selection criteria:

- FAIR resident,
- same gender as case, and
- same age as case, +/- 2 years.

Control selection ratio:

- 4 controls per case.

Physiological data collected for cases only:

- heart disease
- hypertension
- diabetes
- epilepsy
- poor vision
- back problems
- history of previous injury(s).
- fainting/weakness
- arthritis
- medication(s)
- overweight
- foot/leg problems
- ETOH involvement

Environmental data collected for cases and controls:

- community
- housing type
- age of home
- # of occupants
- tread of steps
- width of steps
- height of steps
- riser of steps
- number of steps
- levelness of steps
- handrails present
- porch size (ft^2)
- indoor plumbing
- porch light.

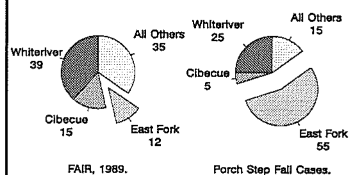
Results

20 cases identified for the 3-year period:

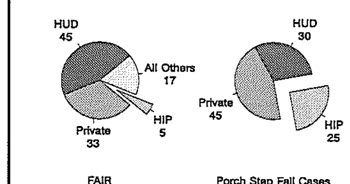
- 60% female; 40% male,
- average age = 52 years,
- > 50 years old = 60%,
- > 50 years and female = 58%,
- fell at night = 30%.

Important findings related to community, housing type, and environmental factors:

Population by Community
(in percentage)



Housing Type
(in percentage)



Comparison of Selected Environmental Factors

Env. Factor	Case	Control
Steps:		
Average Tread	0.93 ft.	1.61 ft.
Average Width	4.05 ft.	5.87 ft.
Levelness (% yes)	39 %	66 %
Handrail present	0 %	32 %
Operable Porch Light	40 %	75 %
Indoor Plumbing	55 %	95 %

Conclusions

No single cause identified.

Multiple potential contributing factors.

Several environmental deficiencies identified.

Unclear physiological factor involvement.

Recommendations from study:

1) share findings with health care staff,

2) share findings and initiate dialog with housing programs,

3) pursue standardized step dimensions in all new construction,

4) prioritize interventions at:
- East Fork community,
- existing HIP and privately constructed homes,
- at homes with residents age 50+.

Severe Assault Injury Study and Outcomes, San Carlos, AZ

Background:

Several years of San Carlos Service Unit (SCSU) Hospital-based Severe Injury Surveillance System (SISS) data revealed assault injury was the leading cause of injury hospitalization and the second leading cause of injury death on the San Carlos Apache Indian Reservation (SCIR). Assault injury was defined as an injury purposely inflicted by another person(s) with intent to injure or kill. This information led to a subsequent descriptive study of severe assault injury on the SCIR [1] that more closely examined potential causative and contributing factors. A severe assault injury was defined as resulting in one or more days of hospitalization or a fatality. The assault injury study epidemiologically described a number of variables for the 60 cases identified for a 3-year period. This was the first effort to epidemiologically describe assault injuries in Indian country.

Problem:

The descriptive study of severe assault injury provided an important characterization of severe assault injury on one Reservation. The study results also disproved some misconceptions about the nature of assault injury. Examples of particular findings included:

- the typical assault victim was a young local male who had been in a fight with or attacked by a known offender,
- male victims outnumbered female victims at a ratio of 4:1,
- some staff in health care, law enforcement, and social services programs speculated that many assault cases would involve domestic violence, child abuse, or elder abuse … this speculation was found to be false,
- cases of child abuse and elder abuse were proportionately low,
- cases of domestic violence to female victims were important, involving half (6 of 12) of these cases,
- a high proportion of assaults occurred during winter months, and
- an inconsistently documented involvement by referral services (Police, Behavioral Health, Social Services).

The study examined only severe assault injuries, which omitted those assault victims treated at the ER and released. Admittedly, inclusion of the less-severely injured cases may have altered the epidemiologic patterns.

Outcome:

The study results opened a multi-disciplinary dialogue at San Carlos about a complex topic that had previously received little or sporadic attention. Examples of subsequent activities at San Carlos included:

- a consultative visit by a violence prevention expert brought multiple programs together to discuss violence prevention, and the issuance of a San Carlos-specific violence prevention resource guide [2],
- completion of a Community Needs Assessment, that focused on the extent of domestic violence,
- the completion of a study that examined the rates of domestic violence, and secondary adverse health effects associated with abuse [3],
- the formation of a Domestic Violence Task Force, and
- the enactment of a domestic violence amendment to the Tribe's Law & Order Code that increased penalties and addressed referral processes.

This study also had an impact beyond San Carlos. The study was replicated at two other Reservation locations: the Fort Apache Reservation and the Hualapai Reservation. Both studies had a similar effect in increasing the dialogue about a previously under-recognized problem. This study also increased the national dialogue within the IHS Injury Prevention program about assault injury and violence prevention in general.

(1) A Descriptive Study of Severe Assault injuries on the San Carlos Apache Reservation; Kenny R. Hicks, Office of Environmental Health & Engineering – completed as part of the IHS Injury Prevention Fellowship Program, April 1995.
(2) Violence Prevention in the San Carlos Apache Tribe: Suggestions for Future Action; Kenneth E. Powell, MD, MPH, Nov. 1997.
(3) Hamby SL and Skupien MB. Domestic violence on the San Carlos Apache Reservation: rates, associated psychological symptoms, and current beliefs. *The IHS Primary Care Provider* 1998; 23: 103-106.

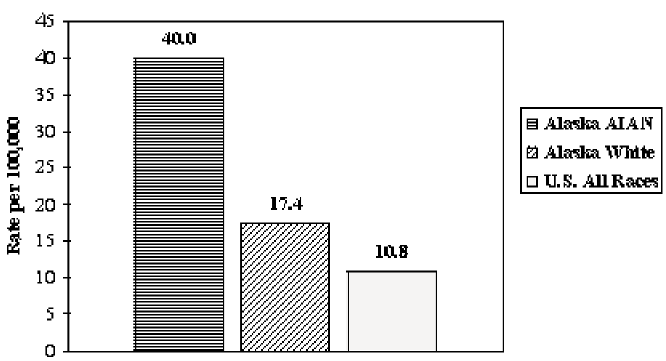
The Prevention of Suicide in Alaska's Tribal Health Care Setting

Kyla Hagan, MPH, Epidemiologist, Alaska Native Tribal Health Consortium, Alaska Native Epidemiology Center, Anchorage, Alaska; Ryan Hill, MPH, Epidemiologist, Alaska Field Station, CDC/National Institute for Occupational Safety and Health, Anchorage, Alaska; and Lisa Wexler, PhD, MSW, Assistant Professor, Community Health Education, Department of Public Health, School of Public Health and Health Sciences University of Massachusetts, Amherst, Massachusetts

Epidemiology of Suicide in Alaska

The Alaska Area has the highest suicide rate of all twelve IHS service Areas.[1] During the period 2000 to 2004, the age-adjusted suicide rate for American Indians and Alaska Natives (AI/ANs) in Alaska was 40.0 per 100,000**.** This rate is 2.3 times greater than the rate for White Alaskans (17.4 per 100,000) and 3.7 times greater than the US All Races population (10.8 per 100,000) (see Figure 1).[2]

Figure 1: Suicide rates, 2000-2004, age-adjusted



Suicide is the fourth leading cause of death among Alaska Native people, resulting in 229 deaths from 2000 to 2004 (see Table 1).[2] If the suicide rate among Alaska Natives (40.0 per 100,000) had been the same as the US All Races suicide rate (10.8 per 100,000), 167 fewer Alaska Native people would have died from suicide during this 5-year time period. Although the US White suicide rate decreased by 12% during 1979 to 2003, there was no significant change in the suicide rate among Alaska Native people during these years.[3]

While suicide rates in non-Native populations nationwide tend to be higher in older people, the opposite is true among Alaska Native people. Alaska Native people over the age of 55 are 57% *less* likely to commit suicide than the US White

Table 1. Alaska Suicide Mortality Rates, 2000-2004, WISQARS

Race	Both Sexes		Males		Females	
	Deaths	Age-Adjusted Rate	Deaths	Age-Adjusted Rate	Deaths	Age-Adjusted Rate
Am Indian/ AK Native	229	40.0	171	59.9	58	19.8
White	403	17.4	326	28.2	77	6.3
All Races	650	20.4	508	31.8	142	8.8

population 55 and older. Conversely, suicide is the leading cause of death for young Alaska Native people ages 15 - 24 and is the second leading cause of death for 25 to 44 year olds. Alaska Native males suffer a suicide rate three times that of Alaska Native females (Table 1). Alaska Native males ages 15 - 24 years suffer the greatest burden. They are almost nine times as likely to die of suicide than US White males in this age group (150.8 per 100,000 vs. 17.6 per 100,000 for 2000-2004).[2] Alaska Native youth have the highest suicide rate of any IHS Area.[4]

The major risk factors for suicide in the general US population include mental and addictive disorders (including alcohol); easy access to lethal means; a history of previous suicide attempts; a history of physical or sexual abuse; a family history of suicidality; and recent and severe stressful life events.[5] Studies specific to AI/AN youth have found that previous suicide attempts, family disruption, loss of ethnic identity, and a lack of a religious or a spiritual connection put these youth at an even higher risk of suicide than youth in the general population.[5] The results of a 3-year suicide 'follow back' study of Alaskan suicides showed that risk factors salient to medical personnel include a disability or illness, a family history of mental illness, previous suicide attempts, aggressive behaviors, and substance abuse.[6] Access to firearms is also seen as a risk factor in a state where two-thirds of all suicide deaths involve firearms.[7]

A recent, systematic review of suicide prevention strategies found that two approaches were effective in preventing suicide: educating physicians on the recognition and treatment of depression; and restricting access to lethal means. Other interventions, such as public awareness and education campaigns, screening programs to identify at-risk individuals, and media efforts (e.g., establishing media guidelines and educating journalists) "need more evidence of efficacy."[8]

Contact with Alaska Health Care System before Suicide

The 3-year Alaska 'follow back' suicide study reviewed suicide decedents' prior access to health care. It showed that 64% of all suicide decedents had seen a primary care physician within six months of their death.[6] Another recent study of Alaska Native males who died from suicide in northern Alaska found that contact with a primary care provider during the year before their death was common in this population. The retrospective case-control study compared 30 suicide cases to 30 controls matched for race, age, gender, and community of residence. Nearly three-fourths of suicide cases received some type of care in the region's medical facilities (regional hospital and village clinics) during the 12 months preceding their death. Compared to the control group, Alaska Native males who died from suicide were 2.8 times more likely to have been treated at the hospital, 3.3 times more likely to have received care for an injury, and 22.2 times more likely to have been treated for an alcohol-related injury during the 12 months preceding their death.[9] These studies suggest that there may be opportunities in the primary care setting to identify those most at risk of suicide and refer these patients to appropriate care before they choose to end their life.

Innovative strategies in Alaska

Within the Alaska Tribal Health System, tribally-operated health care organizations are working to reduce suicide in the health care setting in innovative ways. In addition to traditional pharmacotherapy, outpatient and inpatient behavioral health services and referrals to substance abuse treatment programs, several new programs are being implemented to reduce suicide rates. Initiatives include depression screening; safe firearm storage programs; gatekeeper training for community health aides on the recognition of warning signs of suicide; and case management services for Alaska Native people at risk of self-harm. A few of these programs are highlighted below.

Depression Screening in a Primary Care Setting and Case Management Services. The Southcentral Foundation, a tribal health organization in Anchorage, Alaska, has implemented a depression screening and intervention program in a primary care setting at the Alaska Native Medical Center. The screening and treatment protocol is modeled after the Institute for Healthcare Improvement's Breakthrough Series. The protocol consists of two main components: a patient questionnaire and a provider interview, and was derived from the Primary Care Evaluation of Mental Disorders (PRIME-MD). PRIME-MD is a screening tool designed to assist general practitioners in the diagnosis of minor psychiatric disorders.

Screening for depression begins during intake with the Certified Medical Assistant or Licensed Practical Nurse. Based on responses to an initial set of questions, a second set of questions may be asked to gain more information regarding the severity of depression. After this initial screening and an interview with the provider, a determination is made if antidepressants and/or a referral to behavioral health services are needed. Education about self-care for depression is provided. Follow-up phone contact and in-person visits are made if anti-depressants are prescribed. Between 2001 and 2005, 58% of the patients screened positive for depression had not had a behavioral health visit or been diagnosed with a mood disorder within one year prior to screening.[10] Thus, prior to the implementation of the screening program, these patients may not have been identified as depressed. This suggests that more patients in need of mental health and other services are being recognized and helped.

In May 2006, the Southcentral Foundation launched the Denaa Yeets' (Athabascan for "Our Breath of Life") Program, which provides support and case management services to adult Alaska Native men and women who are at risk of self-harm. Participants can self-refer or be referred to the program by a health care provider. Participants complete a self-harm survey that is used by program staff to develop a care plan. The care plan includes but is not limited to referrals to substance abuse treatment programs, housing services, food assistance programs, and counseling services. The program is designed to facilitate a sense of individual self-worth, cultural identity, and a desire for life by engaging clients and their children in cultural activities including talking circles, drum-making, fishing, and potlucks (Bergeron D. Personal communication, March 28, 2007).

Referral to Gun Locker and Locking Medicine Cabinets for At Risk Youth. A fellow of the Indian Health Service's Injury Prevention Program Development Fellowship implemented an intervention in a village in southwest Alaska for parents or guardians of youth who have suicide risk factors. The program offered parents locking medicine or gun cabinets to store lethal means. Suicidal risk factors considered were trouble with the law; history of suicide attempts; diagnosed mood disorder/behavioral health involvement; recent traumatic event; and alcohol/drug abuse. Local EMS volunteers installed medicine and gun cabinets in the homes of participants. Twenty-four referrals for medicine cabinets were made by local village health aides and 19 medicine cabinets were successfully installed in homes. Seven program participants were referred to the program because of the potentially lethal effects of an overdose of a medication that was prescribed to a member in the home even though none of the youth had risk factors for suicide. Five referrals were not home during the installation phase of the medicine cabinets. Only two referrals were made for gun lockers, so recipients of gun lockers were drawn by lottery. Although installation of the medicine and gun cabinets was well received, no follow-up on the long term use of the cabinets or the program's impact on suicide attempts was conducted (Hagan KD. Unpublished).

Hospital-based Interventions in Rural Alaska. The Maniilaq Association, a tribal health and social service organization in Northwest Alaska is in the process of implementing two hospital-based approaches to suicide prevention in collaboration with Project Life (a new program within Maniilaq Behavioral Health). The first is a long-term postal contact program modeled after a randomized controlled trial conducted by Motto and Bostrom.[11] This program will send letters to people who come into the ED for a suicide attempt. The letters are intended to provide unconditional support for people as well as decrease help-seeking barriers in times of crisis. The letters will be sent by Project Life staff on holidays, birthdays, anniversary dates, and periodically throughout a three-year period. Motto and Bostrom found that their program significantly reduced the suicide rate among clients receiving the letters and for years afterward.

The regional hospital, in collaboration with Project Life, is also implementing a suicide/depression screening process in the acute care and emergency department. In the pilot phase, acute care nurses will do the screening. The screening instrument consists of two primary questions, one focused on depressive symptoms and the other on behavioral risks associated with suicide in the region. If the patient answers "yes" to either question, the nurse will then ask seven additional questions which are focused on depression and suicide risk. If the patient responds affirmatively to any of these questions, they will be referred to Maniilaq Counseling Services. The procedures for doing screening and referral in a culturally appropriate way are currently in development.

In addition to supportive letters and acute care screenings done in the hospital and clinic, Project Life has a wide variety of activities including organizing digital storytelling projects focused on cultural and community strengths; raising suicide awareness and resilience skills in the classroom; promoting a media campaign focused on changing social acceptance of suicidal behavior; aiding institutions in the creation and implementation of suicide prevention protocols; and providing suicide awareness and intervention trainings for clergy, health aides, and other community gatekeepers. The project, which builds on findings from several community-based research projects,[12-13] began in 2006 and is funded by the Substance Abuse and Mental Health Services Administration.

Conclusion

Suicide prevention initiatives, such as depression screening and education about restriction of lethal means, are becoming more common in the health care setting. Interventions developed within the general population should be thoroughly evaluated for cultural appropriateness, applicability, and effectiveness before implementation within a tribal health care setting. Tribal primary and acute care clinics show promise of being an effective place for identifying those at-risk and providing education, referral, and support. Sustainability of such initiatives is one of the biggest challenges that tribal health care organizations will face, as most facilities struggle daily with limited financial resources. To ensure optimal allocation of limited resources, programs need to be evaluated using both primary outcomes (completed and attempted suicides, suicidal ideation) and intermediate impacts (such as help-seeking behavior, identification of at-risk individuals, entry into treatment, and antidepressant prescription rates).[9] Finding effective mechanisms for identifying risk factors and intervening in a clinical setting are the primary tasks of tribal health care organizations as they develop suicide prevention initiatives for their primary care settings.

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prevention. *Int J Circumpolar Health*. 2006;65:448-458.
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Helpful Sites

Indian Health Service Community Suicide Prevention Website: *http://www.ihs.gov/NonMedicalPrograms/nspn/index.cfm?page=NSPN_A39_S124.cfm*

Suicide Prevention Resource Center: *www.sprc.org*

Denaa Yeets Program: *http://www.southcentralfoundation.com/denaa.cfm*

Alaska Statewide Suicide Prevention Council: *http://www.hss.state.ak.us/suicideprevention/*

Acknowledgements

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Introduction to *The IHS Provider* Special Issues on Injury Prevention

Lawrence R. Berger, MD, MPH, Clinical Assistant Professor of Pediatrics, University of New Mexico School of Medicine, Albuquerque, New Mexico

There has been impressive progress toward reducing the burden of injuries among American Indians and Alaska Natives (AI/AN). Over a period of twenty years (1982 - 1984 vs. 2002 - 2004), the age-adjusted mortality rate for unintentional injuries fell 28%, compared to a 5% decline for the US as a whole.[1] Many challenges remain, however, in the realm of both unintentional injuries (e.g., motor vehicle crashes, falls, and poisonings) and intentional injuries (e.g., intimate partner violence, other assaults, and suicides). As noted in the following articles, for example, the suicide rate for AI/ANs in Alaska is almost four times greater than for the overall US population; the motor vehicle mortality rate for one American Indian community is nearly eight times the national average.

Our goal for these special issues of *The IHS Provider* is to raise the visibility of injuries as a leading cause of preventable mortality and morbidity in American Indian and Alaska Native communities. In addition to sharing data for advocacy at the local and national levels, we highlight a number of successful interventions implemented by tribes, tribal organizations, and the IHS. An outstanding characteristic of these programs is that they employ strategies shown to be effective by rigorous evaluations. These are the public health equivalents of the "evidence-based" approaches recommended for clinical medicine.

Injuries can be devastating for individuals, families, and entire communities. We hope that these articles will stimulate new energy, and generate additional resources, for the prevention of both unintentional and intentional injuries.

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Reduce Injuries: Eliminate Disparities in Child Mortality Rates among American Indian and Alaska Native Children and Youth

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Introduction

Disparities in health outcomes among populations have many possible causes. They include socio-economic factors, differences in the availability and accessibility of medical services, variations in the quality of medical care, lifestyle differences, and even genetic influences.[1-5] One example of a major health disparity is the difference in child mortality rates among American Indian/Alaska Native (AI/AN) children and White children.[6] The overall child mortality rate for AI/AN children, ages 1 through 19 years, is 44.28 per 100,000 for the years 2000 - 2002. This rate is nearly 40% higher than that of White children in the US (31.94 per 100,000).[7] Because injuries are the leading cause of death for US children ages 1 - 19, and account for 75% of all deaths among AI/AN children in that age group,[8] we investigated the impact of mortality from injuries on the overall child mortality rate in these two populations.

Methods

We determined cause of injury, and calculated all-cause mortality and age-specific mortality rates, for all AI/AN and White children and youth 0 - 19 years of age in the US using CDC's Web-Based Injury Statistics Query and Reporting System (WISQARS).[7] WISQARS contains mortality data compiled by the National Center for Health Statistics (NCHS). For the years 2000 - 2002, WISQARS categorizes external cause of injury death, and all-cause mortality, from the International Classification of Diseases, 10th Revision.[9] Mortality rates per 100,000 population by race, age, and cause are automatically calculated in WISQARS using population statistics from the US Census Bureau.[7] Injury causes described here are grouped into several categories including all injuries, all unintentional causes, unintentional motor vehicle traffic crashes, unintentional pedestrian events, unintentional drowning, unintentional fire/burn, unintentional suffocation, unintentional poisoning, unintentional falls, homicide, and suicide. Because the vast majority of infants die from non-injury causes, we analyze infants separately in Tables 1, 3, and 4.

To determine the contribution of injuries to all-cause mortality, we calculated an "adjusted" all-cause mortality rate for AI/AN. The adjusted rate assumes that the AI/AN injury mortality rate is equal to the White injury mortality rate. The adjusted rate was obtained by 1) calculating the number of excess AI/AN injury deaths by subtracting the White all-injury mortality rate from the AI/AN all-injury mortality rate and then

Table 1. 10 Leading causes of death, American Indians/Alaska Natives and Whites Ages 0-19 years, both sexes, 2000-2002, United States

Rank	AI/AN*	White*	AI/AN*	White*
	Infants	Infants	Ages 1-19	Ages 1-19
	Number (rate)	Number (rate)	Number (rate)	Number (rate)
1	Congenital Anomalies 169 (137.1)	Congenital Anomalies 12,948 (140.4)	Unintentional Injury** 745 (22.9)	Unintentional Injury 27,453 (15.3)
2	SIDS 152 (110.2)	Short Gestation 7,404 (80.3)	Suicide 163 (5.0)	Malignant Neoplasms 5,170 (2.9)
3	Short Gestation 113 (82.0)	SIDS 4,508 (48.9)	Homicide 132 (4.0)	Suicide 4,727 (2.6)

Table 1. (continued)

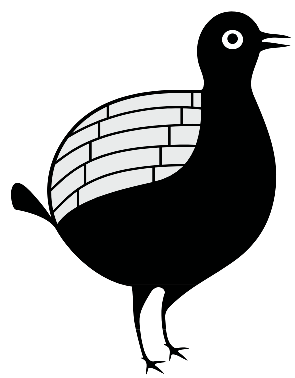
4	Unintentional Injury 67 (48.6)	Maternal Complications 2,809 (30.5)	Malignant Neoplasms 60 (1.8)	Homicide 3,781 (2.1)
5	Maternal Complications 50 (36.3)	Placenta, Cord 2,085 (22.6)	Congenital anomalies 38 (1.2)	Congenital anomalies 2,561 (1.4)
6	Placenta, Cord 33 (23.9)	Respiratory Distress 1,839 (19.9)	Heart Disease 35 (1.1)	Heart Disease 1,692 (0.94)
7	Influenza and pneumonia 29 (21.0)	Unintentional Injury 1,799 (19.5)	Influenza and pneumonia 16	Influenza and pneumonia 562 (0.31)
8	Circulatory System 24 (17.4)	Bacterial Sepsis 1,409 (15.2)	Septicemia 15	Septicemia 475 (0.26)
9	Homicide 21 (15.2)	Circulatory System 1,295 (14.0)	Benign Neoplasms 9	Benign Neoplasms 451 (0.25)
10	Bacterial Sepsis 20 (14.5)	Intrauterine Hypoxia 1,233 (13.4)	Chronic lower respiratory disease 9	Cerebrovascular 428 (0.24)

* Number of deaths (rate per 100,000). Rates are not calculated for those causes with fewer than 20 deaths because of potential instability.

** Injury-related causes are represented in bold.

Table 2. Leading causes of injury death, American Indians/Alaska Natives, and Whites, Ages 0-19, 2000-2002, United States

	AI/AN		White	AI/AN:White
Cause of Death	Number	Rate*	Rate*	Rate Ratio
Motor Vehicle Traffic	517	15.2	9.8	1.5
Pedestrian**	66	1.9	1.1	1.7
Suicide	163	4.8	2.5	1.9
Homicide	153	4.5	2.3	1.9
Drowning	74	2.2	1.4	1.6
Unintentional Suffocation	46	1.4	1.0	1.4
Fire/Burn	36	1.1	0.6	1.8
Unintentional Poisoning	31	0.9	0.7	1.3
Falls	9		0.3	



* Rate per 100,000 population. Rates are not calculated for those causes with fewer than 20 deaths because of potential instability.

** Pedestrian deaths are included in the motor vehicle traffic category.

multiplying the excess death rate by the AI/AN population; 2) subtracting the AI/AN excess injury deaths from the total number of AI/AN deaths from all causes; and 3) re-calculating the AI/AN all-cause mortality rate using the adjusted numerator. Using data from Tables 3 and 4, the calculation for adjusted AI/AN all-cause mortality rate, age 0 - 19 years would be:

1. Excess Deaths = 33.9/100,000 – 20.6/100,000 X 3,396,861 = **452**
2. Adjusted Deaths = 2,482 – 452 = **2,030**
3. Adjusted AI/AN all-cause mortality rate = 2,030 X 100,000 ÷ 3,396,861 = **59.8 per 100,000.**

Results

In the 1 - 19 year age group, the number of *injury deaths* (unintentional injury, homicide, and suicide) is far greater than the number of deaths from the next *seven* leading causes combined: for AI/AN children, 1,040 injury deaths vs. 182

Table 3. Child mortality by age group and leading cause American Indians/Alaska Natives and Whites, 2000-2002, United States

Age	<1	1-4	5-9	10-14	15-19	0-19 total
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)
AI/AN:						
All deaths, all causes	1,039 (100)	284 (100)	142 (100)	226 (100)	791(100)	2,482 (100)
All injury deaths*	96 (9.2)	137 (48.2)	91(64.1)	156 (69.0)	672 (85.0)	1,152 (46.4)
Unintentional injury	67 (6.4)	102 (35.9)	83 (58.5)	120 (53.1)	440 (55.6)	812 (32.7)
Homicide	21 (2.0)	32 (11.3)	6 (4.2)	10 (4.4)	84 (10.6)	153 (6.2)
Suicide			1 (0.7)	24 (10.6)	138 (17.4)	163 (6.6)
White:						
All deaths, all causes	54468 (100)	10,570 (100)	6 ,777 (100)	8,981 (100)	31,121 (100)	111917 (100)
All injury deaths*	2,504 (4.6)	4,612 (43.6)	3,043 (44.9)	4,668 (52.0)	24,248 (77.9)	39,075 (34.9)
Unintentional injury	1,799 (3.3)	3,843 (36.4)	2,712 (40.0)	3,532 (39.3)	17,366 (55.8)	27,453 (24.5)
Homicide	563 (1.0)	666 (6.3)	283 (4.2)	370 (4.1)	2,462 (7.9)	3,781 (3.4)
Suicide			14 (0.2)	672 (7.5)	4,041 (13.0)	4,727 (4.2)

* Includes "intent unknown"

deaths from the next seven other causes (ratio of 5.7:1); for White children, 35,961 injury deaths vs. 11,339 deaths from the next seven other causes (ratio of 3.2:1) (Table 1). Among AI/AN ages 1 - 19 years, the four leading causes of death in rank order are unintentional injuries, suicide, homicide, and cancer. Among Whites ages 1 - 19, the four leading causes are (in order) unintentional injuries, cancer, suicide, and homicide.

The situation is different for infants under one year of age, where congenital anomalies, SIDS, and the consequences of short gestation are the leading causes of death in both populations. Among AI/AN infants, unintentional injury ranks fourth as a leading cause of death, and homicide ninth. Among White infants, unintentional injury ranks seventh as a leading cause of death (Table 1) while homicide ranks fourteenth.

Mortality Rates by Cause and Age Group

Motor vehicle traffic crashes were the leading cause of injury death among AI/AN and White children and youth ages 0 - 19 years, with the AI/AN rate 1.5 times greater than the White rate (Table 2). Suicide and homicide were the second and third leading causes of injury death among AI/AN children and youth, with rates 1.9 times greater than rates for White children and youth. The causes of injury with the least disparity for AI/AN children and youth were unintentional poisoning and unintentional falls. Injury death rates from these causes for AI/AN children and youth were only slightly higher or the same as rates for Whites (rate ratio of 1.3 and 1.0, respectively) (Table 2).

As a percentage of all AI/AN deaths to children and youth, injuries ranged from 9% of deaths among infants to 85% of the deaths to teens aged 15 - 19 years (Table 3). The importance of injuries as a leading cause of death among AI/AN children and youth increases dramatically after infancy, and goes up with each age group. For ages 0 - 19 years combined, almost half of all AI/AN deaths were due to injuries, compared to just over a third of the deaths among Whites (Table 3). For the age groups 1 - 4 and 15 - 19 years, the percentage of deaths due to unintentional injuries was similar for both AI/AN and Whites (36% and 56% respectively). Homicide was responsible for a relatively large proportion of the deaths to young AI/AN children (2% of infants, 11.3% of ages 1 - 4) and older teens (10.6% of ages 15 - 19).

Table 4. Child Mortality Rates* by Age Group American Indians/Alaska Natives and Whites 2000-2002, United States

Age	≤1	1-4	5-9	10-14	15-19	0-19 total
Injury mortality rates						
AI/AN unadjusted	69.6	21.4	10. 4	16.9	76.5	33.9
AI/AN adjusted	27.1	12.5	6.4	9.4	49.8	20.6
White	27.1	12.5	6.4	9.4	49.8	20.6
All-cause mortality rate						
AI/AN unadjusted	753.6	45.3	16.6	24.8	91.4	**73.1**
AI/AN adjusted	710.8	36.4	12.5	17.3	64.7	**59.8**
White	590.6	29.3	14.4	18.4	65.0	**59.2**
3-year population						
AI/AN	137,878	626,519	857,174	909,675	865,615	3,396,861
White	9,221,896	36,091,523	47,155,295	48,734,576	47,893,599	189,096,889

* Per 100,000 population.

† All-cause mortality rates have been re-calculated based on injury mortality rates equal to US White rates. AI/AN adjusted all-cause mortality rate = (total deaths – excess injury deaths) X 100,000 ÷ AI/AN 3-year population

Injury mortality rates were highest among AI/AN infants (69.6 per 100,000) and older teens 15 - 19 years (76.5 per 100,000) (Table 4). When the AI/AN all-cause mortality rate was adjusted for the excess injury rate, the new adjusted all-cause mortality rate for AI/AN ages 0 - 19 years was essentially the same as the White rate (59.8 per 100,000 vs. 59.2 per 100,000) (Table 4 and Figure 1). Adjusted all-cause mortality rates for AI/AN were *lower* than for White rates in age groups 5 - 9, 10 - 14, and 15 - 19 years, but AI/AN adjusted rates remained higher among infants and 1 - 4 year olds (Table 4).

Discussion

A striking finding is that *the overall child mortality rates for AI/AN and US White populations, ages 0 - 19 years would be essentially equal (59.8 vs. 59.2 per 100,000, respectively) if AI/AN child injury rates were reduced to those of the US White population*. In some age groups (5 - 9, 10 - 14, and 15 - 19 years) the overall child mortality rates would be *lower* among AI/AN children. Only among infants and 1 - 4 year olds would the overall child mortality rate remain higher among AI/AN children (Table 4 and Figure 1).

Targeting injury prevention to AI/AN children and youth is especially warranted in light of the age distribution of the AI/AN population. According to the 2000 Census, 33.3% of individuals who are American Indians or Alaska Natives are under the age of 18. Almost 40% of persons who are Navajo, Sioux, or Alaska Natives are under 18 years of age. This compares to 25.6% of the total US population.[10]

If the injury death rate among AI/AN children and youth (birth to 19 years) had been reduced to the rate of White children and youth the same age, an estimated 452 AI/AN injury-related deaths from 2000 - 2002 would have been prevented. Reducing child injury rates among AI/AN children and youth (birth to 19 years) from 34 to 21 per 100,000 (the current rate for Whites and a 38% reduction) is an ambitious goal, but feasible. From 1982 to 2002, unintentional injury mortality rates among AI/AN children aged 0 - 9 years decreased 39%. During this same time period, rates for White children decreased 51%. Among AI/AN youth aged 10 - 19 years, unintentional injury death rates decreased 28%; the decrease among White youth was 30% (CDC, NCIPC, unpublished study). Although AI/AN unintentional injury death rates have decreased over time, the overall injury disparity compared with rates for Whites persists.[6]

Our findings are subject to at least two limitations. First, AI/AN mortality rates probably underestimate the true rates because of misclassification of race on state death certificates. The extent of racial miscoding in AI/AN children and youth is not well-defined, but our reported AI/AN mortality rates should be considered conservative (under-estimates, rather than over-estimates).[11,12] Second, cause-specific rates of infant deaths are complicated by diagnostic ambiguities.[13] Differentiating among unintentional suffocation, SIDS, and child abuse, for example, often requires a postmortem examination, death scene investigation, and detailed review of case records.[14] Particularly in AI/AN communities, geographic isolation, lack of resources, an absence of tribe-specific child mortality review teams, and cultural practices can be barriers to fulfilling these requirements.

Conclusion

Few health disparities have such potential for elimination as the discrepancy in child mortality rates among American Indian and Alaska Native children. In 2000, The IHS Injury

Prevention Program and the American Academy of Pediatrics hosted a Senate briefing in Washington, DC, including the testimony of AI/AN people about the burden of childhood injuries and the need for additional resources. More recently, the national Tribal Injury Prevention Steering Committee (TSC) has requested of Congress $10 million over five years to expand the capacity-building injury prevention program for tribes. While great strides have been made in establishing child passenger safety programs in AI/AN communities, injury prevention programs that target adolescents,[15,16] and interventions to prevent all forms of child maltreatment,[17-21] deserve more emphasis among native populations. Many injury prevention strategies are effective,[22-34] but too few are fully implemented in AI/AN communities.[35-37]

Reducing childhood injuries requires on-going efforts. For example, every newborn requires a car safety seat before leaving the hospital, and programs to enforce traffic safety laws must be repeated often or they lose their effectiveness. There is a need for expanded collaborations among tribal nations, the IHS, and other national agencies and organizations, such as the Bureau of Indian Affairs Highway Safety Program, Department of Justice, and law enforcement groups.

The Committee on Native American Child Health and the Committee on Injury and Poison Prevention of The American Academy of Pediatrics published a joint statement noting that "strong advocacy is needed to promote childhood injury prevention as an important priority for federal agencies and tribes."[37] By highlighting the dramatic impact of child injury rates on overall child mortality, we hope injury prevention programs will be continued and expanded at the local, state, and national levels.

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Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention or the Indian Health Service.

Using Evidence-Based Strategies to Reduce Motor Vehicle Injuries on the San Carlos Apache Reservation

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Introduction and Background

Motor vehicle injuries are a large public health burden for Americans Indians and Alaska Natives (AI/AN). In 2000, the overall motor vehicle injury death rate (age-adjusted) was 27.5 per 100,000 for American Indians/Alaska Natives versus 15.5 for US All Races. In Arizona, the rate was 76.8 for American Indians and 19.9 for All Races.[1] Motor vehicle injuries are an even more severe problem among members of the San Carlos Apache Tribe in eastern Arizona. In 2000, the motor vehicle injury death rate was 117 per 100,000 for American Indians who resided on the San Carlos Apache Reservation.[2]

The San Carlos (SC) Apache Indian Reservation is located in east central Arizona, 110 miles east of Phoenix. There are 10-12,000 tribal members residing on the reservation's 2,812 square miles. Tribal enterprises include a hotel and casino resort, convenience stores and gas stations, a telecommunications company, a construction aggregate supply company, and a saw mill. The unemployment rate in 2003 was 24.8%. There is an IHS hospital at San Carlos which serves primarily as an out-patient facility, and a satellite clinic about 30 miles east in Bylas, where there is also a police department sub-station. The SC tribal police department has 23 full-time officers. There are three full-time tribal judges.

The motor vehicle injury problem on the reservation is exacerbated by two factors: minimal occupant restraint use and alcohol consumption by drivers. In 2002, occupant restraint use on the reservation was 21% for drivers, 10% for adult passengers, and 0% for child car seats.[3] In comparison, the overall safety belt use rate for Indian country (excluding Navajo), was 55% and 81% for the United States overall.[4,5] A 1999 study of motor vehicle crashes (MVCs) on the reservation's four major roadways found that 24% of all crashes involved alcohol. Alcohol was involved in 50% of crashes with a fatality and 38% of all injury crashes.[7]

Evidence-based strategies refer to injury prevention interventions that research has proven to reduce injuries.[8-11] Table 1 summarizes the population-based interventions to reduce motor vehicle occupant injuries recommended by the US Task Force on Community Preventive Services.[12]

Table 1. Population-based interventions to reduce motor vehicle occupant injuries: Recommendations of the Task Force on Community Preventive Services[8]

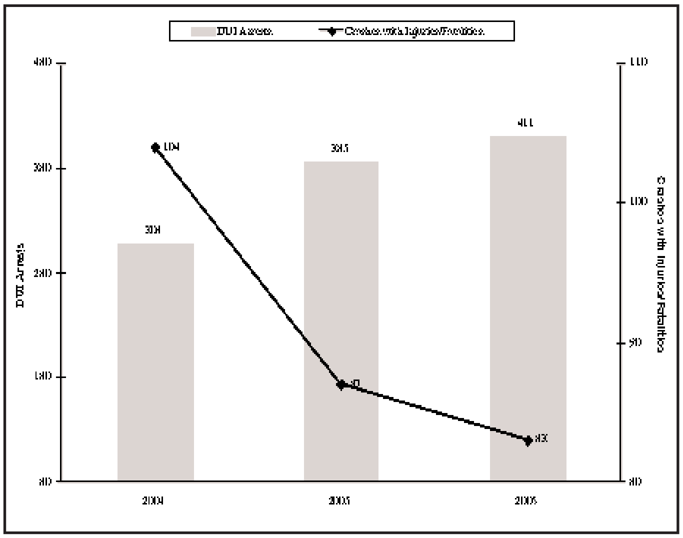
Use of Child Safety Seats	
	Child safety seat laws
	Community-wide information and enhanced enforcement
	Distribution and education campaigns
	Incentive and education Programs
Use of Safety Belts	
	Safety belt laws
	Primary enforcement laws
	Enhanced enforcement
Reducing Alcohol- Impaired Driving	
	.08 blood alcohol concentration (BAC) laws
	Lower BAC laws for young or inexperienced drivers
	Minimum legal drinking age laws
	Sobriety checkpoints
	Intervention training programs for servers of alcoholic beverages
	Mass media campaigns
	School-based instructional programs

Methods

In December 2004, the San Carlos Police Department established a motor vehicle injury prevention program with funds from the Centers for Disease Control and Prevention (CDC). The Motor Vehicle Injury Prevention (MVIP) Program was funded for four years to implement evidence-based strategies to reduce motor vehicle-related injuries and deaths. It currently employes one full-time coordinator. The MVIP Program's interventions and programs were selected from *The Guide to Community Preventive Services*, a systematic review of community-based interventions.[12] Planned program activities included increased sobriety checkpoints, efforts to lower the legal limit to 0.08% blood alcohol concentration (BAC) for drivers on the reservation, and a public information media campaign.

In its first years of operation, the SC MVIP Program

Figure 1. Driving Under the Influence (DUI) arrests and crashes with injuries and/or fatalities on the San Carlos Apache Reservation, 2004-2006



focused on reducing alcohol-associated crashes. The program conducted sobriety checkpoints and implemented a comprehensive media campaign from 2005 through 2006. At a sobriety checkpoint, law enforcement officers systematically stop vehicles to assess drivers' level of alcohol or other drug impairment. Field sobriety and breathalyzer tests were utilized to assess alcohol impairment. The program reviewed sobriety checkpoint resources (manuals, policies, procedures, educational materials, media resources) from the Bureau of Indian Affairs Indian Highway Safety Program; Internet sites (e.g., the National Highway Traffic Administration website, *www.nhtsa.gov*); and by personal visits to other tribal and non-tribal police departments. Standard operating procedures were developed and approved for use by the SC Tribal Law and Order Committee. The locations, times of day, and days of the week for checkpoints were determined with anecdotal evidence and police crash reports. Sobriety checkpoints were conducted by the Police Department's DUI Task Force, which was instituted by the MVIP Program.

The comprehensive media campaign used both fee and non-fee based media. The media included the tribal newspaper and radio station, the local casino marquee, and public bulletin boards. Focus groups were held to develop specific and culturally appropriate messages. Messages were advertised more frequently during tribal and national holidays.

Approval for publication of this report was obtained from the San Carlos Apache Police Department.

Results

Between 2004 through 2006, there were 1,104 DUI arrests and 21 sobriety checkpoints involving 7,536 vehicles. An aggressive education and marketing campaign included 38 public service announcements and 21 community media events. These efforts were associated with a 33% increase in Driving Under the Influence (DUI) arrests, a 20% reduction in crashes involving injuries and/or fatalities (Figure 1), a 33% reduction in nighttime crashes, and 27% reduction in overall police-reported crashes. By contrast, driver, adult passenger, and child restraints – which were not specifically targeted for intervention in 2004 through 2006 — increased a very modest 8%, 6%, and 5%, respectively (Table 2).

Discussion/Conclusions

Sobriety checkpoints and a comprehensive anti-DUI media campaign are effective tools for use in American Indian communities. That the largest (33%) decline in motor-vehicle crashes occurred during night-time hours supports the conclusion that the DUI campaign contributed to decreased drinking and driving.

Our results are consistent with *The Guide to Community Preventive Services* findings that sobriety checkpoints can reduce injuries, deaths, and overall crashes. Several factors contributed to our program's success:

- Basing the MVIP Program in the Tribal Police Department
- Forming extensive partnerships
- Establishing a DUI Task Force
- Hiring a uniquely-qualified program coordinator
- Obtaining consistent funding
- Demonstrating community support
- Providing incentives to participating police officers

The establishment of the MVIP Program was a direct result of the foresight and commitment of the Tribal Police Department. The department's leaders recognized the need for a comprehensive prevention effort; the importance of reliable data collection for planning and evaluation; and the value of extensive partnerships. Having the MVIP Program housed in, and managed by, the police department led to tribal ownership of the program from its very inception.

Program partners included federal agencies (e.g., Indian Health Service, Centers for Disease Control and Prevention, Bureau of Indian Affairs), multiple law enforcement agencies (tribal, state, county, and city municipalities), a private-sector marketing firm, the non-profit Intertribal Council of Arizona (ITCA), and several tribal programs.

The DUI Task Force consisted of police officers, police department administrators (the chief of police and police captain), and the MVIP Program Coordinator. Having a designated Task Force allowed the department to focus enforcement resources on drinking and driving, improve communication with other police jurisdictions, create a strategic plan, and sustain the initiative over time .Long-term (four-years) financial support has enabled the program to carefully plan, implement, and evaluate the interventions. Major expenses included police officer overtime pay and equipment for the sobriety checkpoints.

The Program Coordinator is a San Carlos Apache tribal member with training in injury prevention and accounting, skill in using computers for desktop publishing and database searches, and experience as a tribal employee with SC law

Table 2. Summary of data related to the San Carlos Motor Vehicle Injury Prevention Program, 2004-2006.

Item	2004	2005	2006	*Change from 2004-2006*
Driving Under the Influence				
# of DUI* arrests	308	385	411	33.4 %
# of sobriety checkpoints	0	9	12	12
# vehicles stopped at DUI checkpoints	0	3,644	3,892	3,892
Media				
# of unpaid PSAs**, newspaper articles, local access channel	0	3	4	4
# of paid PSAs, newspaper articles, local access channel	0	11	20	20
# of community media events	0	9	12	12
Total crashes				
# of police-reported crashes	338	276	247	- 26.9%
# of crashes occurring in "daytime" (6 AM – 5:59 PM)	191	159	142	- 25.7 %
# of crashes occurring at "nighttime" (6 PM – 5:59 AM)	146	102	98	- 32.9 %
Crashes with injuries and/or fatalities				
# of crashes with injuries and/or fatalities	104	87	83	-20.2 %
# of fatal crashes	6	6	5	-16.6 %
Observed occupant restraint use (%)				
Drivers	13.2	20.9	20.8	7.6 %
Adult passengers	4.7	15.7	10.3	5.6 %
Children under 9 years	0	8.5	5.1	5.1 %

*Driving Under the Influence
**Public service announcements

enforcement and the Tribal Housing Authority. She has been able to bridge the disciplines of public health and law enforcement, and to work closely with community members, tribal agencies, and policy makers.

A survey in 2005 revealed extensive community support. Ninety-four percent of the respondents indicated it was "very important" to do something to reduce drinking and driving on the SC Apache Reservation, and 81% favored conducting sobriety checkpoints.

Our experience is consistent with factors associated with successful sobriety checkpoint programs nationally: an active local task force to manage checkpoints, available financial and human resources, an effective communication strategy, and support from the general public and officials to deter alcohol impaired driving.[13-16] Also of great value was the use of incentives to encourage participation by police officers in the DUI effort. Incentives included "home-cooked" meals before the checkpoints; awards (food, windbreakers, jackets) for exceptional performance; and an expense-paid trip to a national traffic safety conference for the officer with the most DUI arrests in a calendar year. The incentives were especially important in the face of a chronic shortage of police officers.

Conclusion

In May, 2007, the San Carlos Apache Tribal Council passed two important motor vehicle-related resolutions. The first lowers the presumption of alcohol impairment from a BAC of 0.10% to 0.08%. The second establishes a primary occupant restraint law for the SC Apache Reservation. Both these resolutions are expressions of a commitment to save lives and reduce injuries. They are also an expression of tribal sovereignty, in that the SC code will be a primary law while Arizona's adult occupant restraint law provides for only "secondary" enforcement (that is, seat belt citations can only be issued if a vehicle is stopped for some other violation).

The SC MVIP Program plans to increase its efforts to reduce alcohol-impaired driving by conducting sobriety checkpoints, increasing the frequency of BAC testing, and adopting uniform standards for coding on police reports. It will also seek to vigorously publicize and enforce the primary occupant restraint law.

The combination of police enforcement efforts, educating the public and stakeholders about the seriousness of motor vehicle crashes and methods of prevention, and advocating for needed policy change all greatly enhance the ability of tribe to save lives and reduce suffering. We recommend these evidence-based strategies to other tribal communities seeking to reduce motor vehicle-related injuries and fatalities.

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The Bemidji Area IHS Sleep Safe Program: Increasing Smoke Alarm Usage in American Indian Head Start Homes

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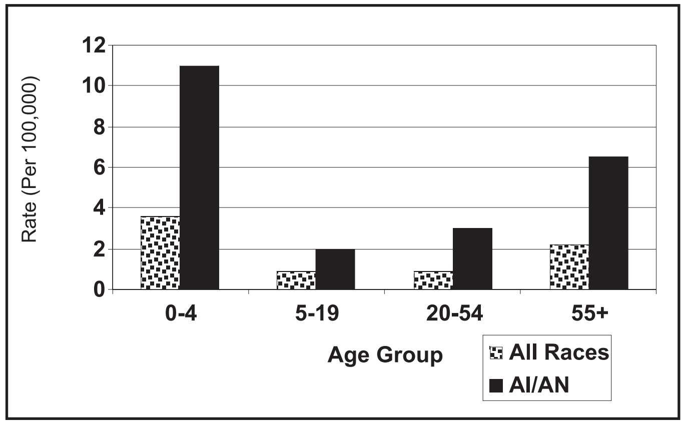
Introduction

The Bemidji Area Indian Health Service (BAIHS) Injury Prevention (IP) Program, part of the Environmental Health Service Section, provides services to 34 reservations in Minnesota, Wisconsin, and Michigan. Our program strives to reduce injury rates of American Indians (AI) by increasing tribal capacity in developing and implementing comprehensive local programs. This is achieved by IHS and tribal environmental health and injury prevention staff working in partnership with local communities in implementation of IP programs.

Although fire-related deaths and disparities have been declining gradually over the past two decades, the residential fire mortality rate for American Indians and Alaska Natives (AI/AN) is 1.5 times the national All Races rate.[1] In AI/AN populations, fire mortality rates vary geographically; they are highest in the north-central and middle western US and Alaska, where rates are 10 times the national All-Races rates.[2] The majority of fatal residential fires for all races combined occur in homes with absent or inoperable smoke alarm(s).[3] Other major risk factors include smoking, alcohol impairment, and physical disability.

Young AI/AN children (preschoolers) and elders are at highest risk of residential fire-related mortality[1]. The high rate of fire-related mortality in children has been attributed to their 1) limited ability to independently and/or quickly escape from a house fire; 2) lack of understanding of the need to escape from fire; and 3) difficulty in awakening from a deep sleep when a smoke alarm sounds.[4] In the Bemidji Area, young AI children aged 0 - 4 years old are at the highest risk of fire-related death (10.9 per 100,000)(Figure 1).[1] This is over three times higher than the All-Races rate for this age group (3.6 per 100,000) in Bemidji Area. Thus, Bemidji Area IHS has prioritized implementing fire safety programs aimed at reducing the exceedingly high rate of fire injury in young AI children.

Figure 1. Age specific fire- and burn-related deaths per 100,000 population, American Indians vs. All Races, by selected age groups, Minnesota, Wisconsin, Michigan combined (Bemidji Area IHS States), 1989-1998*



*Data presented are for years prior to implementation of the Sleep Safe Program

Since the first residential smoke alarm was patented in 1969,[5] they have proven to reduce residential fire-related death by 40 - 60 percent.[6] Although over 90 percent of homes in the US are reported to have at least one smoke alarm,[7] this is often not the case for AI/AN populations. In some AI/AN communities, fewer than half of the homes surveyed had even one operable smoke alarm, and smoke alarms were often disconnected due to frequent "nuisance" alarms from cooking or moisture from bathrooms.[8-10] Factors contributing to nuisance alarms in AI/AN homes include small home size (<1,000 square feet), prevailing use of frying as a cooking method, and location and type of smoke alarm installed.[8,9,11]

Many AI/AN children are enrolled in Head Start. Tribal Head Start grantees are funded through the Administration for Children and Families, Head Start Bureau, United States Department of Health and Human Services. The IHS Head Start Program, through an interagency agreement with the Head Start Bureau, provides preventive health support services for AI/AN grantees. Nationally, 197 tribal Head Start and Early Head Start programs provide comprehensive health, education, nutritional, and other developmental services to

25,911 AI/AN children ages 0 - 5 years in the US.[12] The local Head Start provides a central meeting place where children and parents congregate, classroom instruction and parent meetings, and education and interaction on a variety of topics, including health and safety. These messages are further reinforced by required home visits conducted by Head Start staff.

Several studies have shown that residential fire injury rates declined after targeting high-risk neighborhoods with smoke alarm installation combined with an education and media campaign.[13] Further, one study showed that Head Start home visitors were successful in increasing education and usage of smoke alarms in homes of Head Start children.[14] Consistent with these strategies, we created the Sleep Safe Program in 1998. The goal of this program is to reduce residential fire-related mortality in AI/AN children ages 0 - 5 years through provision of education and installation of smoke alarms. This program is a collaborative partnership between the IHS Division of Environmental Health Services, the US Fire Administration, and the IHS Head Start Program. It emphasizes community partnering via tribal Head Start programs, proper selection and location smoke alarms, education and reinforcement of fire safety educational messages, initial and follow-up home visits to assess smoke alarm operability, and proper installation of smoke alarms.

Methods: Sleep Safe Program Development

Indian Health Service Environmental Health Program staff coordinate the Sleep Safe Program's activities, with the lead Coordinator from the Oklahoma Area IHS and two co-coordinators from Bemidji Area IHS. The initial planning for this program involved a meeting in 1998 between IHS Environmental Health and IHS Head Start representatives to develop an outline for the curriculum.[15] The curriculum was intended to be flexible, based on the recognition that each community has a different set of needs, challenges, partners, and potential risk factors for fire-related injury. We also wanted to ensure flexibility for each site in designating their Sleep Safe Coordinator. The curriculum was drafted using a format consistent with that used in other Head Start educational materials. Additionally, activities were developed to meet Head Start performance standards in community partnering and safety.

Tribal Head Start programs are solicited annually to apply for the Sleep Safe Program. The University of North Carolina School of Public Health (UNC) provided assistance with development of a one-day annual Coordinator's workshop and on-going evaluation and monitoring for Sleep Safe sites participating between 1999 - 2001. They also evaluated the Sleep Safe curriculum annually and assisted in revising the program materials.

The initial curriculum consisted of four "guides" from which feedback was obtained by conducting three focus groups (3 - 6 participants each) of Arizona tribal Head Start teachers and community members who had reviewed and applied the materials at their respective sites. Input from the focus groups was used to improve clarity, readability, ease of application, content, and activities of the curriculum. A facilitator's guide from a resource manual previously developed through a collaborative project with the US Fire Administration to assist AI/AN communities in developing effective fire safety programs[16] was used to guide the focus group sessions.

Evaluation and revision of materials are key to ensuring the effectiveness of the Sleep Safe Program. On-going review of program implementation is accomplished through interviews with coordinators, evaluation of the curriculum and annual coordinator's workshops, retrospective data review, and quality assurance (QA) visits to homes by environmental health staff. The following are core components of the Sleep Safe Program:

Community partnering. Head Start's emphasis on community partnering allows each site to take advantage of local partners that can assist in implementation of their program. Such partners include environmental health, injury prevention, public health nursing, community health representatives, housing and fire departments, Honoring our Children (a Wisconsin program), and others. These partners assist with program implementation including training, data collection and analysis, and installation of smoke alarms.

Curriculum. The original curriculum was expanded from four to eight guides (Figure 2) and is used by project coordinators and their partners in developing and implementing their local comprehensive fire safety programs.

Training. An annual two-day workshop brings coordinators and their environmental health partners together to learn program goals and objectives, and administrative and technical requirements for project implementation. After the workshop, coordinators provide training to local Head Start staff, home visitors, parents, and Head Start students.

Home visits are provided by trained visitors initially and during follow-ups 2 - 8 months later.

Installation of photoelectric smoke alarms equipped with ten-year lithium batteries. Photoelectric smoke alarms were selected due to their lower rate of nuisance alarming.[8,9] We did not provide ionization models with hush buttons because 1) they are prone to nuisance alarming; and 2) many people tend to disable the smoke alarm rather than repeatedly activating the hush button.[17] Sites prioritize installation of smoke alarms to ensure that each home has at least one working smoke alarm. Additional smoke alarms, as available, are installed on each level of the home and in sleeping rooms.

Data tracking during home visits. The one page form collects smoke alarm presence and operability data during initial and follow up visits.

Each Sleep Safe site's progress is monitored via quarterly progress reports submitted to the IHS Sleep Safe Program Coordinator. These reports provide process data such as the number of initial and follow-up home visits conducted, smoke alarm operability, number of smoke alarms installed, training provided, and descriptions of other activities conducted.

Figure 2. Core components and purpose of the Sleep Safe Program Curriculum Guides*

Curriculum Guides		
Component		**Purpose**
1.	Coordinator's Guide	Describes the roles and responsibilities of coordinators and EHO's in implementing program activities
2.	Environmental Health Officer (EHO) Guide	Describes how to plan an effective smoke alarm distribution program, including installation, data collection, and follow-up activities
3.	Smoke Alarm Distribution Guide	
4.	Teacher's Guide	Describes fire safety educational activities that can be provided to parents and children by Head Start teachers
5.	Staff and Childcare Provider's Guide	
6.	Children's Guide	
7.	Tribal Partnerships Guide	Describes how to expand fire safety partnerships and activities to the larger community
8.	Resource Guide	Provides additional resources and Internet sites for fire safety information and activities

*Developed by IHS, USFA, and UNC to support the Sleep Safe Program

Because the goal of the Sleep Safe Program is to ensure at least one operable smoke alarm per Head Start student, impact data tracked are the percent increase in homes with at least one working smoke alarm as determined during initial and follow-up home visits. Anecdotal stories of Sleep Safe Program-installed smoke alarms alerting residents to fire are also collected and documented.

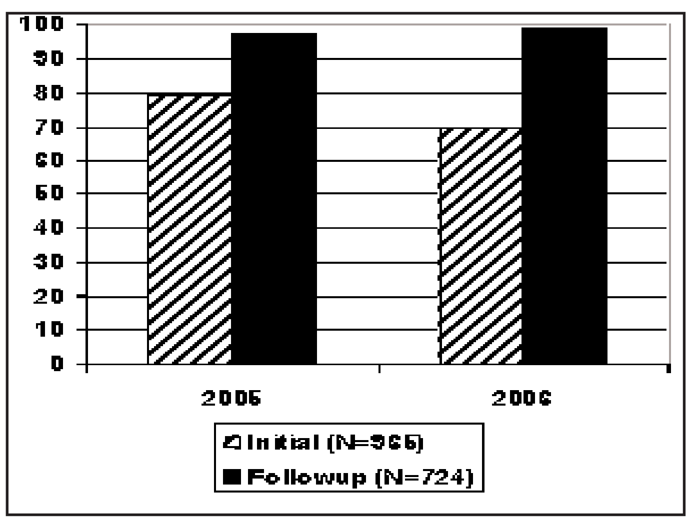
Results

Since fall 1999, 76 tribal Head Start grantees across the country have participated in the Sleep Safe Program as new or continuing sites. These programs have distributed over 20,000 smoke alarms. The results presented below focus on the efforts of the Bemidji Area IHS in implementing this program.

From 1999 to May 2006, the Sleep Safe Program has been implemented by 20 of the 27 Bemidji Area tribes with Head Start programs. Seven of the sites participated for four or more years, two participated for six years, and four participated for only one year. Bemidji Area IHS Sleep Safe sites installed 7,125 smoke alarms. The Minnesota Department of Health provided 984 of these smoke alarms. The cost of the smoke alarms installed by BAIHS Sleep Safe sites totals an estimated $106,876.

Prior to implementing the Sleep Safe Program in the BAIHS, we observed on several reservations that less than 50 percent of homes had at least one working smoke alarm. This is typical of sites in their first year of participation. Continuing Sleep Safe sites see many families re-enrolling their students for several years of Head Start, and their baseline smoke alarm operability tends to increase each year. During FY2005 and FY2006, among all sites in the Bemidji Area, smoke alarm operability increased 40 percent, from a baseline of 70 percent (N=965) to 99 percent (N=724) on follow-up visits (Figure 3). Because of the documented effectiveness of smoke alarms in reducing deaths in residential fires, the observed increase in smoke alarm operability would predict a decrease in residential

Figure 3. Percentage of homes with at least one working smoke alarm, initial and follow-up home visits, Sleep Safe Program Sites



fire mortality. Among American Indian/Alaska Native children ages 0 - 4 years living in the three states of the Bemidji Area (Michigan, Minnesota, and Wisconsin), there have been only two residential fire deaths in the five-year period 2000 - 2004. This compares to ten such deaths in the five-year period (1994 - 1998) preceding the implementation of Sleep Safe in 1999.[1] In addition, we have documented five anecdotal stories of lives saved by smoke alarms installed by local Sleep Safe programs.

Success in the Sleep Safe Program spurred some sites to expand activities within their communities to other aspects of childhood injury prevention. Six Bemidji Area Tribal Head Starts were funded by BAIHS for carbon monoxide (CO) detector installation projects that they did in conjunction with Sleep Safe activities. These sites distributed 906 CO detectors, usually as incentives to ease entry into homes during follow up smoke alarm visits. One site assisted a neighboring non-Tribal Head Start in implementing the program. Interest in child passenger safety led eleven Area Tribal Head Start grantees to apply for the Ride Safe Child Passenger Safety program. This program, implemented in FY 2003, was modeled after Sleep Safe in providing curriculum, educational outreach, and in this case, child safety seat installation. In Bemidji Area, implementation of the Ride Safe Program led to increased expertise of tribes in child passenger safety by training 41 certified CPS techs who distributed over 1,000 child safety seats.

During the initial years of the Sleep Safe program, problems were encountered in the quality of data obtained from many sites, especially those that discontinued participation in the program after one or two years. These problems included 1) forms submitted with inconsistent or missing data; 2) inclusion of self-reported data; 3) failure of some home visitors to fill out some or all of their forms; and 4) forms that were lost.

Discussion

Previous smoke alarm distribution programs often saw a lack of long-term operability of the devices. Residents frequently disconnected the smoke alarm if there were false (“nuisance”) alarms, or they failed to replace a used battery. Sleep Safe addresses these problems by providing ten-year batteries and photoelectric alarms (which are less likely to nuisance alarm); educating parents about the importance of smoke alarms; and promoting parental involvement in the community fire safety effort.

Participation in Sleep Safe by tribal Head Start sites is voluntary. Successful implementation of the Sleep Safe Program varied among project sites. We sought to understand factors that contributed to sites that were able to implement the program and achieve increased smoke alarm usage. Characteristics of successful sites include a motivated coordinator; administrative support for the staff time commitment required of this program; and effective community partnering, especially with IHS or tribal environmental health and/or injury prevention staff. Although 20 sites in Bemidji Area have participated in this program, only seven continued for at least four years. This is due in part to high rates of staff turnover; variable support from Head Start administration; competing priorities and mandates; lack of support from local Environmental Health or Injury Prevention partners; and under-estimation of the time commitment. Some sites discontinued the program after a few years because they had saturated their communities with smoke alarms.

During the early years of the program, many sites were inconsistent in the collection and submission of good quality data. The first home visit data collection form collected volumes of data, some of which were unrelated to fire safety. One copy of this form was filled out during the initial home visit, and one during the follow up visit. Forms that were received often were incomplete, with inconsistent data, and often either the initial or follow up form for any given home was missing. Because of this, the home visit data collection form was radically simplified, with coordinator’s feedback, to collect only smoke alarm installation and operability data. The two pages were combined into one page to keep initial and follow-up data together. A guide was also developed to facilitate and standardize staff training in data collection during field visits. In 2005 we implemented an on-line data collection and analysis program through *Surveymonkey.com*. This tool has greatly improved reporting and data analysis. The data training session was expanded at the annual coordinator’s workshop, and we added a computer laboratory to teach participants data entry and analysis skills.

Random home visits for quality assurance made by a team of environmental health staff on one reservation revealed problems in home visitor standardization. Some of the home visitors had not physically tested the smoke alarms, instead they had telephoned residents or had the residents fill out their own data forms. Some home visitors installed smoke alarms incorrectly, suggesting a need for more effective training of home visitors. At one site, smoke alarms were simply handed out and not installed. We felt that these problems were due in part to lack of partnering by the site’s local environmental health or injury prevention partner and lack of adequate training of Head Start home visitors.

Local environmental health and injury prevention staff can assist their sites by providing staff and community training, assisting with data collection and analysis, and in smoke alarm installations. Because environmental health and injury prevention staff, especially early on, were not often engaged in providing assistance to their sites, we cemented the relationship between them and their site in several ways, as follows: 1) we developed an Environmental Health Officer’s (EHO) Guide to define the roles and responsibilities of EHOs to their sites; and 2) we required attendance by the EHO at the annual coordinator’s workshop. After we made the above changes to data collection and EHO partnering, we obtained our first complete data sets for BAIHS sites during FY 2005 and FY 2006.

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Economic Costs of Motor Vehicle Crashes and Economic Benefits of Prevention for the San Carlos Apache Tribe

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Introduction

American Indians and Alaska Natives (AI/AN) have a motor vehicle-related death rate more than one-and-a-half times greater than the rate for all other Americans (23.48/100,000 vs. 14.46/100,000).[1] To help address this disparity, the Centers for Disease Control and Prevention (CDC) awarded funds in 2004 to four tribes to tailor and implement evidence-based injury prevention programs to reduce motor vehicle-related injuries and deaths among members of their communities. Over the course of the five-year period of the CDC-funded cooperative agreements, each program implemented interventions selected from The Guide to Community Preventive Services, a systematic review of community-based interventions.[2] More information about The Guide and recommended interventions can be found at *www.thecommunityguide.org*.

The San Carlos Apache (SCA) Tribe, one of the four funded tribes, is located in southeast Arizona on 1.8 million acres of land with a population of more than 10,000 residents. In late 2004, the SCA Tribe established their CDC-funded Tribal Motor Vehicle Injury Prevention Program (TMVIPP) within the SCA Police Department. The goal of the SCA TMVIPP was to reduce motor vehicle-related injury and death by decreasing alcohol-impaired driving and increasing restraint use. To reach this goal, a network of partners was established with organizations both internal and external to the tribe, including the Indian Health Service (IHS), the Arizona Department of Public Safety, Mothers Against Drunk Driving (MADD), and several tribal groups. Partners assisted with planning and carrying out program activities, under the lead of the program coordinator. The SCA TMVIPP activities included a comprehensive media campaign, sobriety checkpoints, enhanced police enforcement, and local community events. Data were collected on numbers of DUI arrests, sobriety checkpoints, and motor vehicle crashes, as well as on restraint use. Over the intervention period, the SCA TMVIPP was able to document important successes. Highlights include total DUI arrests increased 52%, motor vehicle crashes decreased 29%, nighttime motor vehicle crashes decreased 27%, and motor vehicle crashes involving injuries and/or fatalities decreased by 31%.[3]

This study builds on the detailed TMVIPP intervention data and evaluation work to examine the economic effects of the SCA TMVIPP. While detailed evaluation data have shown the successes of the program in terms of reductions in crashes and injuries, economic estimates provide valuable information about how such preventive programs affect the economies of tribes. These estimates reflect the amount of resources that may be saved from the TMVIPP and redirected to other

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services.

Approval to conduct and publish this study was obtained from the San Carlos Apache Police Department.

Methods

The SCA TMVIPP collected data on motor vehicle intervention activities (such as number of sobriety checkpoints and DUI arrests); and police-reported crashes, injuries, and fatalities. The police-reported crash and injury data allowed for comparison of motor vehicle crash and injury rates over a period of eight years: four years before the TMVIPP (2001 - 2004) and four years following the implementation of the program (2005 - 2008). Injury data from the local hospital were not used in our analysis because many seriously-injured motor vehicle crash victims were transported elsewhere for care.[4]

The crash and injury data from the SCA police department were not aggregated by age group, gender of victims, or severity of injury. These variables can greatly influence estimates of economic costs. Therefore, estimates of the distribution of motor vehicle-related injuries were made by adopting rates derived from Arizona Crash Outcome Data Evaluation System (CODES) data.[5] The availability of Arizona-wide cost data from the Arizona CODES Project, when coupled with the SCA-specific, police-reported injury data, provided the foundation for estimating motor vehicle injury costs for the SCA community.

In the Arizona CODES project, crash data were collected by police at the scene of the crash; emergency medical systems (EMS) data were collected by emergency personnel at the scene of the crash; and emergency department and hospital data were collected by medical personnel providing treatment at the emergency department (ED), inpatient hospital, or outpatient department or other ambulatory facility. These data were linked further with rehabilitation and long-term care data.

The CODES data were comprised of both direct and indirect costs and include the following cost categories: medical costs (professional, hospital, emergency departments, drugs, rehabilitation, and long-term care); and other costs (police, ambulance, fire, insurance administration, loss of wages, loss of household work, legal and court costs, and property damage.[5] The distribution of fatalities and level of severity of injuries in the 2005 Arizona CODES data were used in the calculation of the overall economic burden of injuries. These data were adjusted (by CODES) to 2006 dollars. The data collection and code-linking methodologies adopted for the 29 CODES-participating states are detailed in several publications.[6-8]

This study used a Human Capital approach to estimate direct and indirect costs and productive life years foregone. This approach was an incidence-based model used to estimate the societal cost of motor vehicle-related injuries and derive lifetime costs. Total annual costs were estimated by motor vehicle injury incidence multiplied by per capita injury costs derived from the CODES cost and injury severity distribution data.

A cost-benefit analysis approach was also used for the estimation and valuation of the effects of the SCA TMVIPP. This approach allowed the comparison of all program costs and ensuing benefits to be valued and reported in dollar terms. To calculate cost-benefit ratios for the CDC-funded TMVIPP, we used total grant expenditures as a proxy for total intervention costs. This is a very reasonable assumption because effective interventions require substantial infrastructure (overhead) and continued scientific evaluation and professional input (consulting, evaluation, program direction, and administration). All of these costs are critical to effective implementation and on-going application of the interventions. Generally, if a program's cost is less than the benefit it produces (in monetary terms) it produces a net social benefit and adoption or continuation should be considered. The marginal (incremental) cost against the marginal benefits a program produces was also estimated in the same monetary units. This provided critical information on the value of expanding, abandoning, or continuing a given program or intervention within a program.[9] Since benefits, like costs, accrue over time, the net benefit in these calculations was estimated with the 3% discount rate used in the CODES project. A net benefit greater than zero indicates a positive economic benefit for the program.

Results

Table 1 displays the SCA alcohol-impaired driving activities and crash and injury statistics for the years 2000 - 2008. From 2000 to 2004, there was a generally increasing trend in motor vehicle crashes and crashes with injuries. This trend was interrupted in 2005, the first full year of interventions implemented through the TMVIPP. The trend from 2005 through 2008 was generally reversed except for 2007, which had an increase in crashes over years 2005 and 2006. However the number of crashes was below those for years 2002 through 2004 and declined again in 2008. These trends were also evident for crashes with injuries and/or fatalities.

Table 2 presents the estimates derived for fatalities per crash and persons injured per crash from the Arizona CODES project for 2005. These estimates were derived from data for the total Arizona population and were not specific for the American Indian population of the state. In the Arizona CODES Project data, fatalities and disabling injuries made up of 1.7% and 9.9%, respectively, of the total number of injuries and fatalities. Non-disabling injuries constituted 35.6% of the total injuries and fatalities, and possible injuries were 54.3% of the total.[6]

Table 3 displays the estimated SCA motor vehicle injuries and associated medical and "other" costs (based on CODES

Table 1. Motor Vehicle Crashes and DUI Data, San Carlos Apache Tribe, 2000 - 2008

Item	2000	2001	2002	2003	2004	2005	2006	2007	2008
Crashes									
Total # of police-report crashes	237	247	343	341	338	276	247	297	240
Total # of fatal crashes	7	4	4	9	6	6	5	4	7
Total # of crashes with injuries and/or fatalities	84	83	88	99	104	87	83	101	72
DUI									
# of DUI arrests	266	245	261	307	308	385	411	391	468
# of sobriety checkpoints on SCA land						9	12	11	7
# vehicles stopped at checkpoints						3,644	3,892	7,002	3,621
# of saturation patrols								6	15

data) from 2001 - 2008. This period represents four years before the TMVIPP began and four years during which interventions and activities of the TMVIPP were carried out. There were increasing numbers of crashes and injuries from 2001 through 2004 and generally declining numbers over the intervention period of 2005 through 2008. It is notable that the first full year of implementation of the TMVIPP was followed by a large reduction of both crashes and injuries. The year 2007 was an exception that saw an increase that nearly equaled 2004, the year prior to the implementation of the prevention program. However, the next year, 2008, showed a dramatic decline in both crashes and injuries to levels previously unattained.

Over the eight-year period, we estimate that more than $7.4 million were spent on medical care for motor vehicle-related injuries. Lifetime costs flowing from motor vehicle-related injuries amounted to over $57 million. Taking as an example 2008 (the year with the lowest number of both motor vehicle crashes and persons with an injury), motor vehicle-related injuries accounted for approximately $7,674 per injury in medical costs and $57,428 per injury in total lifetime costs.

Table 4 compares the number crashes and injuries reported in 2001 - 2004 with 2005 - 2008 and their associated economic costs. The number of crashes decreased by 16.5%, fatal crashes by 4.3%, total fatalities by 3.8%, total crashes with injuries by 8.5%, and total number of persons injured by 8.6%. The economic costs are reported in deflated real (2006) rather than nominal dollars. They show generated reductions of $357,700 in direct medical costs and $2,354,850 in other costs, for a total savings of $2,709,550 for the intervention period.

From 2005 - 2008, total TMVIPP costs were estimated to be $274,696, or about $69,000 per year. The four-year TMVIP intervention savings in Direct Medical Costs alone (over $357,000) more than financed the cost of the interventions. For every dollar spent on interventions, over $1.30 was returned in avoided Direct Medical Costs from reduced numbers of motor vehicle crashes, fewer injuries per crash, and reduced injury severity. Total cost-benefit for the interventions shows a lifetime ratio of about 1:9.86. This means that every dollar spent on interventions yielded a lifetime savings of $9.86.

Discussion

This study estimated the economic cost and burden of injuries resulting from motor vehicle crashes on the San Carlos Apache Reservation in Arizona. These estimates build on the detailed epidemiological and program evaluation work performed during a five year CDC-funded motor vehicle injury prevention program grant awarded to the SCA Tribe.[3] These grants were in response to exceptionally high rates of motor vehicle-related injury and death among AI/AN. For example, for the state of Arizona in 2000 the mortality rate for all races was 19.9 per 100,000 population; 76.8 for American Indians (AI); and 117 per 100,000 for AI living on the SCA Reservation.[1,3] These high rates of motor-vehicle injury substantially impair the ability of tribes to provide adequate health care for their population and to maintain a population structure that promotes productivity and economic development.[10]

The SCA TMVIPP is designed to reduce the number of motor vehicle crashes and the number and severity of injuries per accident. These factors drive the short and long-term medical cost and economic burden on the community. The initial costs of transportation and treatment are frequently compounded by recurring medical costs for continuing care, specialty care, rehabilitation, and long-term care. This is a

Table 2. Estimates of Motor Vehicle Injury and Fatality Incidence, State of Arizona, All Races (CODES Project, 2005)

Total Crashes	139,265
Fatal Crashes	1,038 (0.75%)
Fatalities	1,179
Fatalities per crash	1.136
Injury Crashes	45,361 (32.57%)
Number of Injuries	70,293
Number of Persons Injured per Crash	1.548

burden on the health care resources available to the community. The community is also affected by the loss of income and productivity that injured individuals, their families, and other caregivers would have generated if the injuries had been avoided.

Over the eight-year period of this study, economic costs due to lost productivity and income from injury victims and those who care for them totaled nearly $50 million ($49,829,149). Prior to the TMVIP Program institution, the previous four years had seen increasing numbers of motor vehicle crashes and injuries each year from 2001 through 2004. During the years of TMVIP Program implementation, reductions were not only seen in terms of crashes and injuries but also costs. There were some fluctuations in the numbers of crashes, injuries, and costs during the program period. However, during the TMVIP Program (from 2005 to 2008) crashes were reduced by 16.5%, total crash fatalities by 3.8%, and the total number of crash-related injuries by 8.6%. These decreases suggest that the interventions had a positive effect. Moreover, the program period showed a total reduction of $2,709,550 in direct medical and other costs. These results have a large impact on the ability of the community to develop and grow, as the impact of crash-related injuries is recurring and continues to affect the economic potential of the community over a very long period.

The value of the TMVIPP was also estimated using a cost-benefit approach: for every dollar spent on interventions, there was a lifetime benefit of $9.86 saved. This ratio represents a substantial return on investment. It compares favorably to cost-benefit analyses of other preventive approaches, such as worksite wellness programs ($1 to $4.75 saved per $1 spent), screening newborns for PKU and hypothyroidism ($6.60 to $13.80), drug courts ($2.80 to $6.32), and preconception care of women with diabetes ($1.24 to $5.19).[11-14]

Table 3. Estimated Economic Cost of Motor Vehicle Injuries (includes fatalities), San Carlos Apache Tribe, 2001-2008

	2001	2002	2003	2004	2005	2006	2007	2008	2001-2008
Individuals with motor vehicle injuries	130	136	153	161	135	128	156	111	1,110
Medical Cost	$736,483	$809,294	$954,130	$1,056,770	$924,835	$915,712	$1,163,008	$851,784	$7,412,016
Other Cost	$5,241,982	$5,598,490	$6,457,780	$7,302,072	$6,116,950	$6,020,747	$7,568,398	$5,522,730	$49,829,149
Total Cost	$5,978,465	$6,407,784	$7,411,910	$8,358,842	$7,041,785	$6,936,459	$8,731,406	$6,374,514	$57,241,165

Limitations

These cost estimates are conservative for several important reasons. First, there is a high probability of incomplete reporting of serious motor vehicle injuries due to absence of information about victims transported to referral hospitals.[4] Second, it is very difficult to obtain complete cost data. Even the CODES project has been only partially successful in generating cost data from all the myriad sources of payment, including Medicare, Medicaid (AHCCCS), IHS Direct and Contract care, FEHB, private health insurance from other payers, and other public sources (VA, TriCare, etc.). Furthermore, the injury and fatality incidence data are derived from CODES data for the total Arizona population and are not specific for American Indians. Therefore, these cost estimates are conservative because of the higher incidence of serious motor vehicle-related injuries in this population, the rural environment, shortage of specialized emergency facilities and personnel, and long distances and travel times required for transport of injured patients.

Motor vehicle crash and injury data are also incomplete. A recent study on crash reporting for the San Carlos Apache Reservation showed that for the year 2001, the actual number of motor vehicle crash injuries was 60% higher than the police reported injuries. Additionally, motor vehicle-related fatalities reflected deaths at the scene of the crash while many deaths occurred during transit to, or at, tertiary facilities. Total fatalities may be as much as 20% to 30% higher than reported.[4] Finally, the cost estimates do not include the value of such intangibles as pain and suffering or stress and depression, which can be serious and long-term outcomes of these crashes.

Table 4. Changes in Motor Vehicle Crashes, Fatalities, Injuries, and Economic Costs, San Carlos Apache Tribe, 2001 - 2004 and 2005 - 2008

	2001-2004	2005-2008	Difference (% change)
Crashes and Injuries			
Total # of police-reported crashes	1,269	1,060	209 (-16.5%)
Total # of fatal crashes	23	22	1 (-4.3%)
Total # of fatalities	26	25	1 (-3.8%)
Total # of crashes with injuries (includes fatalities)	375	343	32 (-8.5%)
Total # of individuals with injuries (includes fatalities)	580	530	50 (-8.6%)
Estimated economic costs			
Medical Cost	$4,149,320	$3,791,620	- $357,700
Other Cost	$27,281,460	$24,926,610	- $2,354,850
Total Cost	$31,430,780	$28,721,230	- $2,709,550 (-8.6%)

Conclusions

Motor vehicle-related injuries and deaths are preventable. Crashes place an economic and societal burden on tribal communities. Through the work of the SCA TMVIPP and the active participation of many members in the community in the design, implementation, and operation of motor vehicle injury prevention interventions, there were reductions in crashes and injuries.

Not only do crashes result in numerous injuries and deaths, but the economic estimates in this study quantify their economic burden. From 2001 through 2008, economic costs associated with medical care and productivity losses to the SCA Tribe totaled more than $57 million. Cost reductions were seen during the period that TMVIPP was implemented. The cost-benefit for the TMVIPP showed a lifetime ratio of about 1:9.86. This means that for every dollar spent to implement the prevention program, there were almost $10 in savings from reduced medical and other costs.

These estimates provide information for health service resource utilization and health policy decisions, as well as valuable information for the design of cost-effective interventions to prevent motor vehicle-related injuries. The large and continuing burden of motor vehicle injury and death demands that effective programs be implemented, sustained, continuously evaluated, and improved.

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Case Studies in Injury Prevention

Injury Surveillance-Based "Success Stories"

San Carlos Cattle Guard Project, San Carlos, Arizona

Background:

Several years of San Carlos Service Unit (SCSU) Hospital-based Severe Injury Surveillance System (SISS) data indicated that motor vehicle crash (MVC) injury was a leading type of severe injury on the San Carlos Apache Indian Reservation (SCIR). This information led to several subsequent MVC studies that reviewed Tribal Police Department MVC reports. The MVC studies identified risk factors related to MVC's and the associated injuries.

A more recent MVC study [(1)] completed in 1999 evaluated crashes on 4 major SCIR roads. Two of the roads included in the study were U.S. Highway 70 and Indian Route (IR) 6.

Problem:

The 1999 report examined a variety of crash variables. The data analysis for crash location and collision type revealed one problem near the junction of U.S. 70 and IR 6, namely collisions with livestock. Eighteen collisions with livestock occurred along 2 miles of U.S. 70 (milepost 258-259) near this junction, while 7 occurred along the first mile (milepost 0) of IR 6 from this junction. All of the 25 vehicle-livestock collisions occurred at night. On-site evaluations at this area found several related problems:

- the cattle guard on IR 6 at the U.S. 70 junction (see photo at right), which is located along the U.S. 70 right-of-way fence line, was damaged (the side railing was bent), and was an older design (the distance between the rails was less than the newer design),
- several other cattle guards in this vicinity were of similar age and condition, and
- cattle had been observed crossing the cattle guards, which is the very action a cattle guard is intended to prevent.

It was concluded that the condition of these cattle guards along these sections of the two roads allowed livestock to cross the cattle guards and gain access to the roadways, contributing to the incidence of vehicle-livestock collisions.

Outcome:

Concerns about the livestock collision cluster, the condition of cattle guards in this vicinity, and the access by livestock into the U.S 70 right-of-way were discussed with the Arizona Department of Transportation (ADOT), who has maintenance responsibility for U.S. 70. Based on the crash data and the observed condition of the cattle guards, ADOT agreed to fund $50,000 to address the problem if the Tribe would perform the construction work. A project scope-of-work and an intergovernmental agreement were prepared and approved by both the Tribe and ADOT in late 2001. The San Carlos Tribal Utility Construction program removed 6 old cattle guards in this area and replaced them with 6 new cattle guards in 2002. The photo at right shows a newly installed cattle guard.

This project demonstrates the value of solid epidemiologic data in identifying a problem, the further value of using an identified problem to design a targeted intervention, and the willingness of the affected parties to collaborate on the solution to the problem. As experienced in this case, a time frame of several years from problem identification until completion of an intervention is common with a highway engineering project.

(1) A Descriptive Study of Motor Vehicle Crashes on Four Major Roads Located on the San Carlos Apache Reservation: 1990-1997, Casey Crump, IHS/Office of Environmental Health & Engineering – completed as part of the IHS Injury Prevention Fellowship, June 1999.

Case Studies in Injury Prevention

Injury Surveillance-Based "Success Stories"

Severe Injury Surveillance Systems and Spin-Off Studies/Projects

Eastern Arizona District OEHE

Background:

As recommended by injury prevention consultant Leon Robertson, PhD, hospital-based severe injury surveillance systems (SISS) were implemented in the mid-to-late 1980's at the three Service Units (Keams Canyon, San Carlos, and Whiteriver) in the Phoenix Area/Eastern Arizona District OEH&E, and were among the first local injury surveillance systems in Indian country.

Problem:

Each individual SISS provided basic epidemiologic data for the hospitalized or fatal injuries occurring within its jurisdiction. The data became quite valuable in describing the local epidemiology of injury, in identifying specific injury problems, and in appropriately focusing attention on the public health importance of injury in the local population. In several instances, the SISS data identified local injury problems that were amenable to targeted interventions. However, these surveillance systems, by design, were not intended to capture all potential etiologic factors for all identified injury types.

Outcome:

A valuable aspect of these local surveillance systems was the use of the SISS data to identify local injury problems or issues that needed further study or action. This "spin-off" effect has been substantial, resulting in numerous special studies or projects that focused on specific injury topics. These contributions by several generations of IHS and Tribal staff provided greater insight into specific locally-defined injury issues. Several led to interventions designed to prevent specific types of injury. A few evaluated the effectiveness of an intervention. All have been important to furthering the knowledge of injury at their respective community. These "spin-off" studies/projects, in approximate chronological order, include:

1. A Study of Roadway and Roadside Hazards on the Fort Apache Indian Reservation, 1986.
2. Motor Vehicle Crashes Occurring on State Route 70 within the San Carlos Apache Reservation, 1985-1987.
3. Effect of Lighting on Night-Time Pedestrian Collisions on the White Mountain Apache Reservation, 1989.
4. A Retrospective Case-Control Study of Porch Step Falls on the Fort Apache Indian Reservation, 1987-1989.
5. A Study of the Incidence of Motor Vehicle Crashes Occurring on US 70 and State Route 170 within the San Carlos Indian Reservation, 1988-1989.
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12. A Follow-Up Study of Motor Vehicle Crashes Occurring on State Route 264 on the Hopi Reservation, 1990.
13. Highway 70 Widening Project, San Carlos Apache Reservation, 1991.
14. A Descriptive Study of Severe Assault Injuries on the San Carlos Apache Indian Reservation, 1995.
15. Effects on Motor Vehicle Crashes of the Livestock Control Project on the Fort Apache Indian Reservation, 1995.
16. Highway 73 Milepost 338.96 School Crosswalk Project, Fort Apache Indian Reservation, 1995.
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33. Using Evidence-Based Strategies to Reduce Motor Vehicle Injuries on the San Carlos Apache Reservation, 2007. [d]
34. Challenges to Injury Surveillance at the Local Level, 2010. [e]
35. Child Passenger Safety: A Comprehensive Program is a Sustainable Program, 2010. [f]
36. Improving Severe Injury Surveillance in the Phoenix Area Using Arizona Hospitalization and Mortality Data. [g]

(a) *Morbidity and Mortality Weekly Report* 1989; 38 (34): 589-591 (http://www.cdc.gov/mmwr/preview/mmwrhtml/00001451.htm)
(b) Consultant summary reports (Kenneth E. Powell, MD, MPH)
(c) *The IHS Primary Care Provider* 1998; 23: 103-106
(d) *The IHS Primary Care Provider* 2007; 32: 209-212
(e) *The IHS Primary Care Provider* 2010; 35: 23-29
(f) *The IHS Primary Care Provider* 2010; 35: 178-182
(g) *The IHS Provider Care Provider* 2011; 36: 22-26

In addition, the available local SISS data helped Tribal programs define and substantiate injury problems/concerns in successful applications for external grant funding to develop local injury prevention programs. These funded Tribal programs include:

1. First Mesa Consolidated Villages, Injury Prevention Program, IHS funded (TIPCAP), 2000-2005.
2. White Mountain Apache Tribe, Injury Prevention Program, CDC funded (TMVIPP), 2004-2008.
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6. Hopi Tribal Motor Vehicle Injury Prevention Program, CDC funded (TMVIPP), 2010-2014.

<u>Summary</u>:

The initial step in the public health approach to a problem is to first define that problem. Prior to the establishment of the Severe Injury Surveillance Systems at these three Service Units, it was difficult to epidemiologically define injury problems in these communities with any degree of accuracy or specificity. The development of these local Severe Injury Surveillance Systems provided the needed accuracy/specificity, and proved to be great investments in developing the injury prevention programs in the respective communities. As expected, they more accurately described the basic epidemiology of injury. Less anticipated was the dramatic impact the surveillance systems would have in identifying injury problems amenable to intervention, in supporting the development of those interventions, in providing the stimulus for further study of particular injury interests, in supporting the development of local injury prevention programs and projects, and in supporting applications for external grant funding. The number of studies, projects, and programs listed above well illustrates that impact.

(Case Studies SISS Spin-off Studies)

Development of a Domestic Violence Protocol, Whiteriver, AZ [1]

Background:

Several years of Whiteriver Service Unit (WRSU) Hospital-based Severe Injury Surveillance System (SISS) data revealed assault injury was a leading cause of injury on the Fort Apache Indian Reservation (FAIR). This led to a study of severe assault injury on the FAIR [2] that more closely examined potential causative and contributing factors. The assault injury study found females accounted for 21% of assault victims, and the leading type of assault for female victims was domestic violence. Based on these data, a multi-disciplinary Domestic Violence Prevention Team was formed to address the issue of domestic violence. A key member of this Team was the WRSU Social Worker.

Problem:

The WRSU Social Worker initially assessed the existing hospital protocol for responding to or treating domestic violence victims, and found several key departments within the hospital each had its own criteria. In addition, the assessment revealed several other issues that may have limited effective response to domestic violence victims, including:

- lack of uniformity in how domestic violence victims were identified,
- inconsistent knowledge regarding which departments should receive domestic violence referrals,
- referrals with incomplete and/or vaguely worded verbiage that made follow-up difficult, and
- referrals that consisted of only giving the victim the phone number for a safe house.

The law enforcement members of the Team described barriers related to the investigation and prosecution of domestic violence cases. One significant barrier was the Tribal Law & Order Code had no specific provision for domestic violence. Such cases were handled similarly to any other assault case which required the victim to file a complaint against the assailant. Unfortunately, many domestic violence victims would later drop the complaint – a situation believed to perpetuate the cycle of abuse.

Outcome:

The Team convened in April 1996 and developed an inter-agency domestic violence protocol. This protocol included:

- a specific definition of a domestic violence victim,
- specific measures to identify, treat, and refer victims of domestic violence,
- a domestic violence assessment tool for service providers to complete for victims,
- a release of information form (to facilitate referral to the police, prosecutors, and Tribal Behavioral Health), and
- a referral process to WRSU Social Services for further victim assessment and intervention.

The WRSU Social Services conducted training to appropriate Hospital staff and to police staff regarding the domestic violence protocol, the domestic violence assessment process, and the release of information forms.

Upon the implementation of the new domestic violence protocol in mid-1996, the WRSU Social Services program saw a dramatic increase in the number of domestic violence referrals. The average number of referrals per year to Social Services in 1994-1995 was 20; the average for 1997-1998 was 185. In addition, various Tribal programs committed time, funding, and effort, including 1) successful pursuit of several grants that addressed domestic violence issues, 2) the police department hired two officers to specifically work with domestic violence cases, 3) the behavioral health program hired a counselor for domestic violence victims and offenders, 4) the prosecutor's office hired an additional prosecutor specifically for domestic violence cases, and 5) the Tribal Council amended its Law & Order Code to specifically address domestic violence, including mandatory arrest, civil orders of protection, increased sentencing for offenders, and mandatory counseling.

(1) The Development of a Domestic Violence Protocol at the Whiteriver Indian Hospital, Whiteriver, Arizona; Joan J. Perank, LMSW, WRSU Social Services – completed as part of the IHS Injury Prevention Fellowship Program, June 1999.
(2) A Descriptive Study of Severe Assault Injuries on the Fort Apache Indian Reservation; Leslie P. King, MD/MPH Student and Dennis M. Williams, R.S., Field Sanitarian, Whiteriver Service Unit; November 1996 (unpublished).

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ENERGY DAMAGE AND THE TEN COUNTERMEASURE STRATEGIES

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An important landmark is reached in the evolution of a scientific field when classification of its subject matter is based on the relevant, fundamental processes involved rather than on descriptions of the appearances of the phenomena of interest. In illustration, a fundamental turning point was reached when the debilitation and progressive susceptibility to bruising of shipboard scurvy could for the first time be classified as the process resulting from a deficiency of consumption of something variously present in fruits and vegetables (much later identified as ascorbic acid, Vitamin C). In fact, such transition from classifications consisting essentially only of a description of appearances to those based on fundamental processes is basic to scientific progress generally; hence, examples abound from the full gamut of scientific concerns.

Additional illustrations, among the many, include the classificatory and conceptual transitions that followed recognition:

a. That rocks could be grouped on the basis of the processes involved in their formation—as sedimentary, igneous, metamorphic.

b. That the variations among the Galapagos finches studied by Darwin were the result of differential ecologic processes.

c. That earthquakes were one aspect of tectonic processes.

d. That the epidemic disease of the young which could for decades be described only as "infantile paralysis" was a rare variant of a commonplace process initiated by infection with one of several similar and previously unknown viruses.

e. That plague was a process in which a specific pathogen, *Pasteurella pestis,* rats, fleas, and people interacted.

EXTRARATIONAL EXPLANATIONS IN THE ABSENCE OF PROCESS KNOWLEDGE

Before such conceptual and hence classificatory advance, lacking an understanding of process, and therefore of the possibility of human intervention or avoidance, phenomena of concern to people have commonly been attributed to extrarational factors. "Luck," "chance," "accident," "fate," and similar terms are the hallmarks of such ignorance, and perhaps of a human necessity for explaining it away (8). The distinction between the way in which people tend to deal with the understood as opposed to the merely known-about is illustrated nicely by the renowned anthropologist Malinowski. He found that Trobriand natives viewed the hazards outside the reef, which they did not understand, in ways more supernatural than they viewed those inside the reef, which they did understand. As he wrote, "It is most significant that in the lagoon fishing, where man can rely completely upon his knowledge and skill, magic does not exist, while in the open-sea fishing, full of danger and uncertainty, there is extensive magical ritual to secure safety and good results" (16).

DIVINE PUNISHMENT AS AN EXPLANATION IN THE ABSENCE OF PROCESS UNDERSTANDING

The Book of Job epitomizes another commonplace aspect of human response to undesirable happenings not yet understood—and therefore not yet categorized—in process terms. The events are explained as divine retribution for shortcomings. The suffering of oneself, someone else, or some group occurs because it is divine and well-deserved punishment. Therefore, unless

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the sin can be expiated by appropriate change in behavior, it may be "too bad," but there is nothing else to be done to ameliorate the personally or societally undesirable happening unless it is an increase in efforts at human reform.

EXPANDED CLASSIFICATORY SETS, AND DIFFERENT SETS

The transition to understanding of underlying, relevant processes commonly results in more than just a relabeling of past groupings (8). Usually the phenomena previously recognized have been "the tip of the iceberg," and the recognition of underlying process adds much more. Thus, in the case of what was originally termed "infantile paralysis," it was found that the infectious process routinely involved hundreds of individuals subclinically for each person ill enough to be diagnosed. Moreover, parallel illustrations are legion, not only from medicine but also widely from other sciences.

For example, understanding the actual nature of earthquakes is to classify them conceptually as one aspect of a far broader range of tectonic processes; and understanding the origins of a butterfly or a clam is to identify it in terms of its life cycle, a process classification. Understanding the process involved in eclipses is to classify them as one aspect of celestial mechanics.

Another frequent result of transition to process-based understanding is regrouping of phenomena not merely in expanded sets, but in new

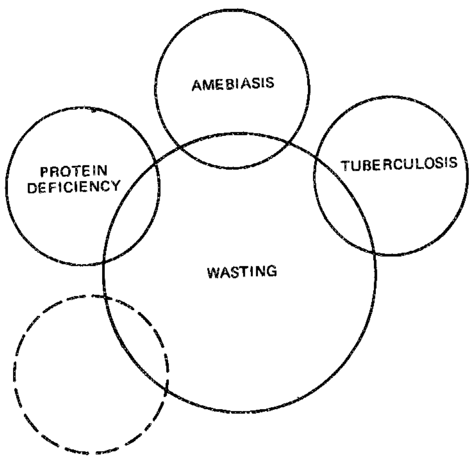


FIG. 1. An illustration of the parcelling out to etiologically defined sets of the components of a descriptively defined set of pathology.

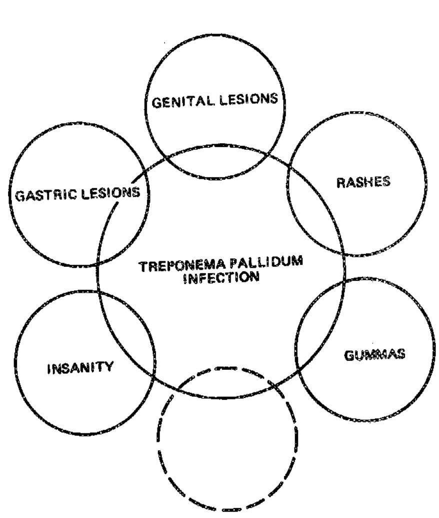


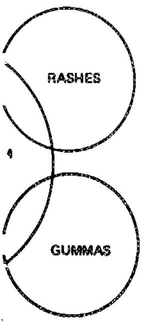
FIG. 2. An illustration of the incorporation of portions of various descriptively defined sets of pathology into an etiologically defined set.

sets that do not bear a one-to-one correlation with the old. Figure 1 illustrates this. As process (or, to use a related [medical] term, etiologic) understanding advanced, the set of phenomena formerly referred to as "wasting" was, in effect, parcelled out to such process-defined sets as tuberculosis, amebiasis, protein deficiency, and a host of others (8).

More relevant here is to view the process in reverse; that is, from the standpoint of the etiologic or process sets in picking up pieces of many pre-existing descriptive sets, as illustrated in Figure 2 (8).

Thus syphilis, the etiologic set based on the infectious agent, *Treponema pallidum*, picked up parts of previous descriptive sets, such as paresis, gummas, penile lesions, rashes, certain gastric lesions, certain abnormalities of the growing ends of bone, and many others, but not all of those in any one of the earlier descriptive sets. Again, an important point is that there is usually not in such transitions a one-to-one relationship between the earlier, descriptive ways of looking at the phenomena and those process-based which are substituted for them (8).

The foregoing is brief background for that which follows, an introduction to the classification of certain widespread, important phenomena defined and grouped in terms of a small number of closely parallel processes. Most of the included phenomena are not yet regarded in process terms by the implicit and explicit classi-



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fications still applied to them by most professionals and laymen. Yet there is widespread, implicit, and at least qualitative recognition of the processes themselves, because cultures, past and present, abound in actions directed at changing the outcome of these processes through intervention at specific points in their sequences.

ENERGY DAMAGE PROCESSES

The phenomena of concern are those involved when energy is transferred in such ways and amounts, and at such rapid rates, that inanimate or animate structures are damaged (1, 6–8, 10, 14). (Much of the remainder of this paper closely follows Reference 10.) The harmful interactions with people and property of hurricanes, earthquakes, projectiles, moving vehicles, ionizing radiation, lightning, conflagrations, and the cuts and bruises of daily life illustrate this class.

10 STRATEGIES FOR REDUCING THESE LOSSES

Several strategies, in one mix or another, are available for reducing the human and economic losses that make this class of phenomena of social concern. In their logical sequence, they are as follows:

The *first* strategy is to prevent the marshalling of the form of energy in the first place: preventing the generation of thermal, kinetic, or electrical energy, or ionizing radiation; the manufacture of gunpowder; the concentration of U-235; the build-up of hurricanes, tornadoes, or tectonic stresses; the accumulation of snow where avalanches are possible; the elevating of skiers; the raising of babies above the floor, as to cribs and chairs from which they may fall; the starting and movement of vehicles; and so on, in the richness and variety of ecologic circumstances.

The *second* strategy is to reduce the amount of energy marshalled: reducing the amounts and concentrations of high school chemistry reagents, the size of bombs or firecrackers, the height of divers above swimming pools, or the speed of vehicles.

The *third* strategy is to prevent the release of the energy: preventing the discharge of nuclear devices, armed crossbows, gunpowder, or electricity; the descent of skiers; the fall of elevators; the jumping of would-be suicides; the undermining of cliffs; or the escape of tigers. An Old Testament writer illustrated this strategy in the context both of the architecture of his area and of the moral imperatives of this entire field: "When you build a new house, you shall make a parapet for your roof, that you may not bring the guilt of blood upon your house, if any one fall from it" (3). This biblical position, incidentally, is fundamentally at variance with that of those who, by conditioned reflex, regard harmful interactions between man and his environment as problems requiring reforming imperfect man rather than suitably modifying his environment.

The *fourth* strategy is to modify the rate of spatial distribution of release of the energy from its source: slowing the burning rate of explosives, reducing the slopes of ski trails for beginners, and choosing the re-entry speed and trajectory of space capsules. The third strategy is the limiting case of such release reduction, but is identified separately because in the real world it commonly involves substantially different circumstances and tactics.

The *fifth* strategy is to separate, in space or time, the energy being released from the susceptible structure, whether living or inanimate: the evacuation of the Bikini islanders and test personnel, the use of sidewalks and the phasing of pedestrian and vehicular traffic, the elimination of vehicles and their pathways from community areas commonly used by children and adults, the use of lightning rods, and the placing of electric power lines out of reach. This strategy, in a sense also concerned with rate-of-release modification, has as its hallmark the elimination of intersections of energy and susceptible structure —a common and important approach.

The very important *sixth* strategy uses not separation in time and space but separation by interposition of a material "barrier": the use of electrical and thermal insulation, shoes, safety glasses, shin guards, helmets, shields, armor plate, torpedo nets, antiballistic missiles, lead aprons, buzz-saw guards, and boxing gloves. Note that some "barriers," such as crash padding and ionizing radiation shields, attenuate or lessen but do not totally block the energy from reaching the structure to be protected. This strategy, although also a variety of rate-of-release modification, is also separately identified because the tactics involved comprise a large, and usually clearly discrete, category.

The *seventh* strategy, into which the sixth blends, is also very important—to modify appropriately the contact surface, subsurface, or basic structure, as in eliminating, rounding, and softening corners, edges, and points with which people can, and therefore sooner or later do, come in contact. This strategy is widely overlooked in architecture, with many minor and serious injuries the result. It is, however, increasingly reflected in automobile design, and in such everyday measures as making lollipop sticks of cardboard and making some toys less harmful for children in impact. Despite the still only spotty application of such principles, the two basic requisites, large radius of curvature and softness, have been known since at least about 400 B.C., when the author of the treatise on head injury attributed to Hippocrates wrote: "Of those who are wounded in the parts about the bone, or in the bone itself, by a fall, he who falls from a very high place upon a very hard and blunt object is in most danger of sustaining a fracture and contusion of the bone, and of having it depressed from its natural position; whereas he that falls upon more level ground, and upon a softer object, is likely to suffer less injury in the bone, or it may not be injured at all . . ." (15).

The *eighth* strategy in reducing losses in people and property is to strengthen the structure, living or nonliving, that might otherwise be damaged by the energy transfer. Common tactics, often expensively underapplied, include tougher codes for earthquake, fire, and hurricane resistance, and for ship and motor vehicle impact resistance. The training of athletes and soldiers has a similar purpose, among others, as does the treatment of hemophiliacs to reduce the results of subsequent mechanical insults. A successful therapeutic approach to reduce the osteoporosis of many postmenopausal women would also illustrate this strategy, as would a drug to increase resistance to ionizing radiation in civilian or military experience. (Vaccines, such as those for polio, yellow fever, and smallpox, are analogous strategies in the closely parallel set to reduce losses from infectious agents.)

The *ninth* strategy in loss reduction applies to the damage not prevented by measures under the eight preceding—to move rapidly in detection and evaluation of damage that has occurred or is occurring, and to counter its continuation and extension. The generation of a signal that response is required; the signal's transfer, receipt, and evaluation; the decision and follow-through, are all elements here—whether the issue be an urban fire or wounds on the battlefield or highway. Sprinkler and other suppressor responses, firedoors, MAYDAY and SOS calls, fire alarms, emergency medical care, emergency transport, and related tactics all illustrate this countermeasure strategy. (Such tactics have close parallels in many earlier stages of the sequence discussed here, as, for example, storm and tsunami warnings.)

The *tenth* strategy encompasses all the measures between the emergency period following the damaging energy exchange and the final stabilization of the process after appropriate intermediate and long-term reparative and rehabilitative measures. These may involve return to the pre-event status or stabilization in structurally or functionally altered states.

SEPARATION OF LOSS REDUCTION AND CAUSATION

There are, of course, many real-world variations on the main theme. These include those unique to each particular form of energy and those determined by the geometry and other characteristics of the energy's path and the point or area and characteristics of the structure on which it impinges—whether a BB hits the forehead or the center of the cornea.

One point, however, is of overriding importance: subject to qualifications as noted subsequently, there is no logical reason why the rank order (or priority) of loss-reduction countermeasures generally considered must parallel the sequence, or rank order, of causes contributing to the result of damaged people or property. One can eliminate losses in broken teacups by packaging them properly (the sixth strategy), even though they be placed in motion in the hands of the postal service, vibrated, dropped, piled on, or otherwise abused. Similarly, a vehicle crash, per se, need necessitate no injury, nor a hurricane housing damage.

Failure to understand this point in the context of measures to reduce highway losses underlies the common statement: "If it's the driver, why talk about the vehicle?" This confuses the rank or sequence of causes, on the one hand, with that of a loss-reduction countermeasure—in this case "crash packaging"—on the other.

There are, nonetheless, practical limits in physics, biology, and strategy potentials. One final limit is operative at the boundary between the objectives of the eighth and ninth strategies. Once appreciable injury to man or to other living structure occurs, complete elimination of undesirable end results is often impossible, though appreciable reduction is commonly achievable. (This is often also true for inanimate structures, for example, teacups.) When lethal damage has occurred, the subsequent strategies, except as far as the strictly secondary salvage of parts is concerned, have no application.

There is another fundamental constraint. Generally speaking, the larger the amounts of energy involved in relation to the resistance to damage of the structures at risk, the earlier in the countermeasure sequence must the strategy lie. In the ultimate case, that of a potential energy release of proportions that could not be countered to any satisfactory extent by any known means, the prevention of marshalling or of release, or both, becomes the only approach available. Furthermore, in such an ultimate case, if there is a finite probability of release, prevention of marshalling (and dismantling of stockpiles of energy already marshalled) becomes the only, and essential, strategy to assure that the undesirable end result cannot occur.

FOR EACH STRATEGY AN ANALOGOUS OPPOSITE

Although the concern here is the reduction of damage produced by energy transfer, it is noteworthy that to each strategy there is an opposite focused on increasing damage. The latter are most commonly seen in collective and individual violence—as in war, homicide, and arson. Various of them are also seen in manufacturing, mining, machining, hunting, and some medical and other activities in which structural damage, often of a very specific nature, is sought. (A medical illustration would be the destruction of the anterior pituitary with a beam of ionizing radiation as a measure to eliminate pathologic hyperactivity.) For example, a maker of motor vehicles or of aircraft landing-gear struts—a product predictably subject to energy insults—could make his product more delicate, both to increase labor and sales of parts and materials, and to shorten its average useful life by decreasing the age at which commonplace amounts of damage increasingly exceed in cost the depreciating value of the product in use. The manufacturer might also design for difficulty of repair by using complex exterior sheet metal surfaces, making components difficult to get at, and other means.

The type of categorization outlined here is similar to those useful for dealing systematically with other environmental problems and their ecology. In brief illustration, various species of toxic and environment-damaging atoms (such as lead), molecules (e.g. DDT and heroin), and mixtures (garbage and some air pollutants, among others) are marshalled, go through series of physical states and situations, interact with structures and systems of various characteristics, and produce damage in sequences leading to the final, stable results.

Similar comments can be made concerning the ecology of some of the viral, unicellular, and metazoan organisms that attack animate and inanimate structures; their hosts; and the types of stages of damage they produce. Actual and potential birth control and related strategies and tactics can be somewhat similarly categorized. Thus, in brief, beginning on the male line: preventing the marshalling of viable sperm (by castration or certain pharmacological agents); reducing the amount of sperm produced; preventing the release of semen (or of one of its necessary components, e.g., by vasectomy); modifying the rate of spatial distribution of release of semen (as in hypospadias, a usually developmental or traumatic condition in which the urethra opens on the underside of the penis, sometimes near its base); separating semen release in space or time from the susceptible ovum (e.g., continence, limiting intercourse to presumably nonfertile periods, coitus interruptus, and preventing a fertile ovum from being present when sperm arrive); separation by interposition of a material barrier (e.g., condoms, spermicidal creams, foams, jellies); increasing resistance of the ovum to penetration; making the ovum infertile, even if penetrated; prevention of implantation of the fertilized egg; abortion; and infanticide.

Sufficient differences among systems often exist, however—for example, the ecology of the agents of many anthropod-borne diseases is quite complex, and the life cycles of organisms such as schistosomes require two or more different host species in sequence—to preclude at this time many generalizations useful across the breadth of all environmental hazards and their damaging interactions with other organisms and structures.

A SYSTEMATIC ANALYSIS OF OPTIONS

It has not generally been customary for individuals and organizations that influence, or are influenced by, damage due to harmful transfers of energy to analyze systematically their options for loss reduction, the mix of strategies and tactics they might employ, and their cost. Yet it is entirely feasible and not especially difficult to do so, although specific supporting data are still often lacking. In fact, unless such systematic analysis is done routinely and well, it is generally impossible to maximize the pay-offs both of loss-reduction planning and of resource allocations.

Such analysis is also needed to consider properly the problems inherent in the use of given strategies in specific situations. Different strategies to accomplish the same end commonly have different requirements; in kinds and numbers of people, in the disciplines involved, in material resources, in capital investments, and in public and professional education, among others. In the case of some damage-reduction problems, particular strategies may require political and legislative action more than others. And, where the potential or actual hazard exists across national boundaries, correspondingly international action is commonly essential.

The types of concepts outlined in this note are basic to dealing with important aspects of the quality of life, and all of the professions concerned with the environment and with the public health need to understand and apply the principles involved—and not in the haphazard, spotty, and poorly conceptualized fashion now virtually universal. It is the purpose of this brief note to introduce the pathway along which this can be achieved.

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APPENDIX A

This appendix gives additional examples of tactics classified by the strategy categories into which they fall. The strategies, identified sequentially I–X, are:

I. To prevent the initial marshalling of the form of energy.
II. To reduce the amount of energy marshalled.
III. To prevent the release of energy.
IV. To modify the rate of spatial distribution of release of energy from its source.
V. To separate in space or time the energy being released from the susceptible structure.
VI. To separate the energy being released from the susceptible structure by interposition of a material barrier.
VII. To modify the contact surface, subsurface, or basic structure which can be impacted.
VIII. To strengthen the living or nonliving structure which might be damaged by the energy transfer.
IX. To move rapidly in detection and evaluation of damage and to counter its continuation and extension.
X. All those measures which fall between the emergency period following the damaging energy exchange and the final stabilization of the process (including intermediate and long-term reparative and rehabilitative measures).

Dismantling nuclear bombs and preventing production	I
Limiting nuclear bomb size and manufacture	II
Total nuclear use-ban treaty	III
Plastic surgery	X
Making polo goal posts to yield on impact	VII
Old tires on sides of tugs	VI
Railroad under- and overpasses	V
Parachutes	IV
Fire alarms	IX
Seeding an established hurricane	IV
Built-in automobile crash padding	VII
Fallout shelters	VI
Sanding icy sidewalks	III
Aircraft carrier arresting gear	IV
Keeping people out of dry woods	III
Fire doors	VI
Boiler safety valves	IV
Opening volcanoes to achieve controlled release	IV
Lubricating San Andreas Fault to cause a succession of small slippages (see "The Modification of the Planet Earth by Man," by Gordon J. F. MacDonald, *Technology Review*, October/November, 1969)	IV
Aircraft landing and takeoff priorities	V
Skin grafts for burns	X
Diver's decompression routine	IV
Hanging padding in horse stalls	VI
Wrapping padding on goalpost supports	VI
Window washers' belts	III
Fire-retardant clothing	IV
Sunburn lotion that blocks U.V.	VI
Chaining tigers	III
Not moving flowerpots over onto windowsills	III
Stopping hemorrhage	IX

Banning explosives in tunnels or under "air rights" buildings	V
Skiers' "pre-season conditioning"	VIII
Mouth-to-mouth resuscitation	IX
Teaching Braille to a blinded soldier	X
Use of retaining walls to prevent California mud slides	III
Storm cellars in tornado areas	V and VI
Underground disposal of radioactive wastes	V and VI
Snuggling auto bumpers in sheet metal	Opposite of V
Causing earthquakes by damaging streams (see MacDonald, noted above)	Opposite of I
Spacesuits	A variety of VI
Smoking in bed	Opposite of III
Pointing a spear; edging a sword	Opposite of VII
Skin tanning in relation to subsequent sun exposure	A naturally occurring illustration of VIII
Release bindings on skis	A variety of III, preventing further energy release
Earmuffs	A variety of VI
Reducing amount of explosive in each shipment	II
Playing with matches in pine woods	Opposite of III
Welders' goggles and helmets	VI
Fire fighters' suits	VI
Fire escapes	V
Lengthening fuses on explosives	V (to allow the lighter to avoid injury)
Roadside ("breakaway") poles that yield gently when hit	VII
Lowering crib heights to reduce brain and other injuries when infants fall out	II
Preventing the conception of tigers to prevent subsequent human injury	I
Developing less expensive fender repair methods	X
Stopping a would-be suicide from jumping	III
Reduce the calibre and number of firearms in private hands	II
Eliminate utility poles from roadsides	IV
The electrical fuse	A variety of III; it could be argued that the disconnection is usually achieved by V or VI (barrier, air), but whatever the physical means, the primary strategy is to prevent (further) release of energy

APPENDIX B

This appendix gives four case studies, applying the fundamental approach to provide systematic, basic options analysis of four important public problems. The tactics and overall statements are *not* intended as definitive. They are illustrative only, and not necessarily practical. Furthermore, these will not treat questions of priorities for optimum strategy-influence on the end results, a subject touched on elsewhere (8, 11). The first three of these examples are from Reference 12. As in Appendix A, the strategy options are labeled I–X in logical, consecutive order.

Case Study A: *Reducing the Losses Associated with Femoral Fractures among the*

Elderly. This mechanical energy-damage problem has customarily been conceived as a problem primarily of preventing falls and of treatment once injured. Systematic analysis gives a richer range of options, an analysis more likely to identify ways for greater loss reduction.

I. Do not raise patients above their surroundings. Do not allow the high-risk elderly to stand. What does not go up cannot come down. Note that the "potential energy," the release of which in falling produces damage, is a characteristic of the falling person or other body, and that from the standpoint of injury to that same body cannot be regarded as being transferred to it at the moment of impact. The same point holds for the "kinetic energy" released when a person, for example, is injured walking or running into a wall.

II. If patients and other high-risk elderly must be raised, raise them less far, or for shorter intervals. Keep beds lower. Use wheel chairs instead of walking, and housing into and in which steps, stairs, and inclines are eliminated.

III. Keep them from falling. Use measures that retard deterioration of, or improve sensorimotor and musculo-skeletal status and performance. Eliminate occasions and means for tripping. Improve coefficients of friction of underfoot surfaces and of shoes. Make sure shoe heels are broad and not worn unevenly. Repair heels. Provide handgrips, canes and walkers, bedrails, and, as necessary, restraints.

IV. Provide walkers, wall handgrips, or other means for reducing rate of fall, for example, when tripped. (The author is not certain of good sample tactics for IV.)

V and VI. Since the falling person carries her own energy, separation is, in this context, in a sense, theoretically impossible.

VII. Cover impactable floor and other surfaces with energy-managing barriers—"crash-padding." This technique, used in vehicles and elsewhere, is a largely ignored tactic for reducing femoral damage. In hospitals and other environments of and for the elderly it has considerable potential, since impact forces decrease directly with increase in stopping distance (1, 7, 11). Eliminate, soften, or round sharp points, protruding corners, and edges. Soften bathroom and other microenvironmental hardware and structures.

VIII. Increase relevant musculo-skeletal strength. Develop measures that reverse or lessen postmenopausal and other osteoporosis and of soft tissue weakening. Ideally, these should be "passive" rather than "active," (13) that is, as with pasteurization, chlorination, fluoridation, vaccination, food enrichment, and vehicular air bags and other crashpackaging tactics, as little as possible or no active cooperation should be required on the part of the individuals to be protected (13). *If* effective in reducing osteoporosis, addition of an essential mineral to deficient water supplies would illustrate this tactic and principle (5). The same point concerning passive approaches being preferable holds generally whenever possible for all strategies.

IX. Emergency medical care. Splinting. Orthopedic surgery. Prostheses. Casts. Traction.

X. Intermediate medical care, long-term reparative and rehabilitative care.

It should be noted that the reduction of mechanical energy-damage to the brains of infants produced by falls from cribs can be similarly analyzed, and that the tactics are similar, and in some cases identical (9).

Case Study B: *Reducing Thermal Energy Damage to Children and Others.* As a practical matter, analyses of the thermal-damage problem must include consideration of circumstances that can produce heat quickly. This is the case especially in relation to strategy options I–IV.

I. Do not keep gasoline, old newspapers, and other flammables in the house. Do not make dwelling units flammable. Do not allow bedding, nightclothes, sweaters, saris, and appropriate other garments to be flammable. Eliminate space and floor heaters (2, 14, 17).

II. Reduce the amount of such items. Reduce brewing temperatures for coffee and tea.

III. Stop smoking in bed, in storage areas, in explosives plants. Keep coffee cups and other hot items out of reach of infants and small children. Improve their stability and handles (? eliminate handles). Keep matches, cigarettes, and people out of dry woods.

IV. Fire-retardant paints. Cups that spill at a different rate or in a different direction.

V. Don't brew or use coffee and tea when small children are or will be near. Use blowtorches and other hot items at a distance from people to be protected. Don't use night clothes.

VI. Interpose thermal insulation. Firedoors.

VII. Make the hot object of material that has both low heat content and inability to transfer heat at hazardous rates: for example, the glass doors of some household ovens (most are not yet adequately designed in this respect), and the double-walled (with air between) design of some Japanese teacups.

VIII. Make people more resistant to heat in a way somewhat analogous to sun-tanning, for example, by use of salt-tablets.

IX. Organize equivalent of poison control centers. Organize for quick response in bringing emergency medical care and the burned together. Make sure, require, and enforce that ambulance and other emergency personnel are very well able to deal with burns.

X. Grafting and other cosmetic surgery. Psychotherapy. Retraining.

Case Study C: *Reducing Drownings.* Drownings are the result not of energy damage per se, but in essence of interference with energy exchange. As such, they are a prime illustration of a closely related class of ecologic phenomena (6, 7), and can be approached just as easily with this basic options analysis.

Other members of this group include carbon monoxide and cyanide poisoning, and the various forms of strangulation and nonaqueous suffocation. Frostbite and the varieties of cardiac and vascular malfunction causing interference with the energy exchange provided by the circulating blood provide additional illustrations (7).

Identifying options for reducing losses of this type succumbs to essentially the same approach, the difference being that the environmental hazard central to the analysis is not one of the forms of energy, but rather the cause of such interference with energy exchange—water, by definition, in the case of drowning:

I. Prevent the synthesis or aggregation of water. Do not collect it. Prevent rainfall, do not build swimming pools.

II. Reduce the amount marshalled. Produce or bring together cup- not pool-fulls. Reduce precipitation.

III. Prevent its release to site of concern. Do not open the dam, tap, or hydrant.

IV. Modify the rate of aggregation or spatial distribution of the water aggregated. Control rate of release from source, use sluice gates. Seep through ground rather than flow through irrigation ditches. Make shallow.

V. Separate the water and the target population. Route streams away from play areas. Clam at low tide; cross estuaries when the water has receded; cross while not in flood, e.g., the legendary crossing of the Red Sea (4).

VI. Interpose material barrier. Dykes, sea walls, fences around swimming pools. Well and culvert covers. Use flotation gear, face mask and snorkel, diving suit, submarine, or diving bell.

VII. Modify the water. Spray, vaporize, or freeze.

VIII. Make the people less susceptible to drowning. Teach swimming, including breath-holding. Increase vital capacity. Develop gills.

IX. Emergency response. Teach lifesaving, including retrieval from water, resuscitation. Air-sea rescue operations. Equip boats and littoral with life preservers, boats, ropes and ladders (for ice breakthroughs).

X. Intermediate and long-term reparative and rehabilitative measures. In the case of drowning, this strategy usually has little to offer.

Case Study D: *Reducing Mob Damage Losses to the White House or other Private or Public Building.* Mobs, other than through coercion, example, and interference with normal social intercourse, most commonly produce damage through the application of energy in excess of the thresholds of target animate and inanimate structures. All crowds have muscle power, and hence can potentially damage by transfer of mechanical energy, as with rocks, fists, and breaking down doors and other barriers. Some mobs also have other forms of energy with which to damage. These include explosives—whether as bombs or in firearms—and incendiary devices. Though from a quantitative standpoint often dissimilar both in range and in their potential targets, the same general, qualitative analysis applies equally to them as to all cases within the general class.

Using the same strategy-option nomenclature given above, the following illustrate the options for reducing possible damage to the White House. This is an example of a commonplace contemporary and historic problem also illustrated by moats, castle walls, Renaissance palace architecture, the Kremlin, and the apparent policy in Roman Britain of encamping troops at a distance from headquarters to lessen the likelihood of damage from their rioting.

I. Prevent crowd formation.

II. Keep crowds small. Limit the number of persons allowed in Lafayette Park (across the street from the White House). Proposals under recent Presidents to level a nearby block for a public and parade assembly area fundamentally violate this principle.

III. Prevent crowd from becoming unruly. That is, permit only "peaceful assembly."

IV. Modify rate and spatial distribution of the mob's energy release, as with water hoses, tear gas, arrests.

V. Only allow demonstrations at more distant loci—the Washington Monument grounds, or in West Potomac Park. Phase for less convenient days and times, or those when there is less to damage.

VI. Barriers. Fences, doors, moats, hedges, walls, and ornamental pools. Park buses interposed in lines bumper-to-bumper.

VII. Prevent carrying or availability of devices used to localize mechanical force: brass knuckles, chains, knives, loose benches.

VIII. Strengthen structure. Force-resistant exteriors and glazing, locks, reinforced framing, fireproofing.

IX. Emergency response. Signal generation and transfer, evaluation, decision, command, dispatch of response from nearby, and control.

X. Clean-up and stabilization.

Finally, several miscellaneous points seem especially noteworthy in this context:

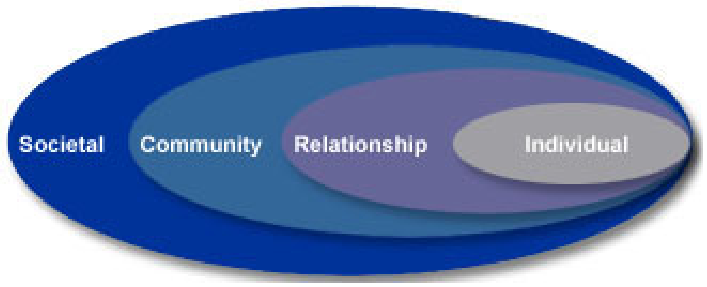
The various poisoning problems, including lead poisoning and all drug addictions, are also readily susceptible to such basic, and very similar, options (and causal) analyses.

Since basic analysis in the energy damage problem field and its use must be based primarily on physics, as must many aspects of more quantitative work, some subtlety of understanding of physics is very helpful. For example, the "Tigers" (1) categories are not merely boxes in a classification scheme; the first eight reflect fundamental aspects of the physical world.

Moreover, the phenomena so represented are rapidly occurring, typically transient subsets of the ecology of energy flows, distributions, and changes. It is important that the relationships between these derivatives of the larger sets be understood in relation to them.

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives. Protecting People.™

The Social-Ecological Model: A Framework for Prevention



The ultimate goal is to stop violence before it begins. Prevention requires understanding the factors that influence violence. CDC uses a four-level social-ecological model to better understand violence and the effect of potential prevention strategies (Dahlberg & Krug 2002). This model considers the complex interplay between individual, relationship, community, and societal factors. It allows us to address the factors that put people at risk for experiencing or perpetrating violence.

Prevention strategies should include a continuum of activities that address multiple levels of the model. These activities should be developmentally appropriate and conducted across the lifespan. This approach is more likely to sustain prevention efforts over time than any single intervention.

Individual

The first level identifies biological and personal history factors that increase the likelihood of becoming a victim or perpetrator of violence. Some of these factors are age, education, income, substance use, or history of abuse. Prevention strategies at this level are often designed to promote attitudes, beliefs, and behaviors that ultimately prevent violence. Specific approaches may include education and life skills training.

Relationship

The second level examines close relationships that may increase the risk of experiencing violence as a victim or perpetrator. A person's closest social circle-peers, partners and family members-influences their behavior and contributes to their range of experience. Prevention strategies at this level may include mentoring and peer programs designed to reduce conflict, foster problem solving skills, and promote healthy relationships.

Community

The third level explores the settings, such as schools, workplaces, and neighborhoods, in which social relationships occur and seeks to identify the characteristics of these settings that are associated with becoming victims or perpetrators of violence. Prevention strategies at this level are typically designed to impact the climate, processes, and policies in a given system. Social norm and social marketing campaigns are often used to foster community climates that promote healthy relationships.

Societal

The fourth level looks at the broad societal factors that help create a climate in which violence is encouraged or inhibited. These factors include social and cultural norms. Other large societal factors include the health, economic, educational and social policies that help to maintain economic or social inequalities between groups in society.

Reference

Dahlberg LL, Krug EG. Violence-a global public health problem. In: Krug E, Dahlberg LL, Mercy JA, Zwi AB, Lozano R, eds. World Report on Violence and Health. Geneva, Switzerland: World Health Organization; 2002:1–56.

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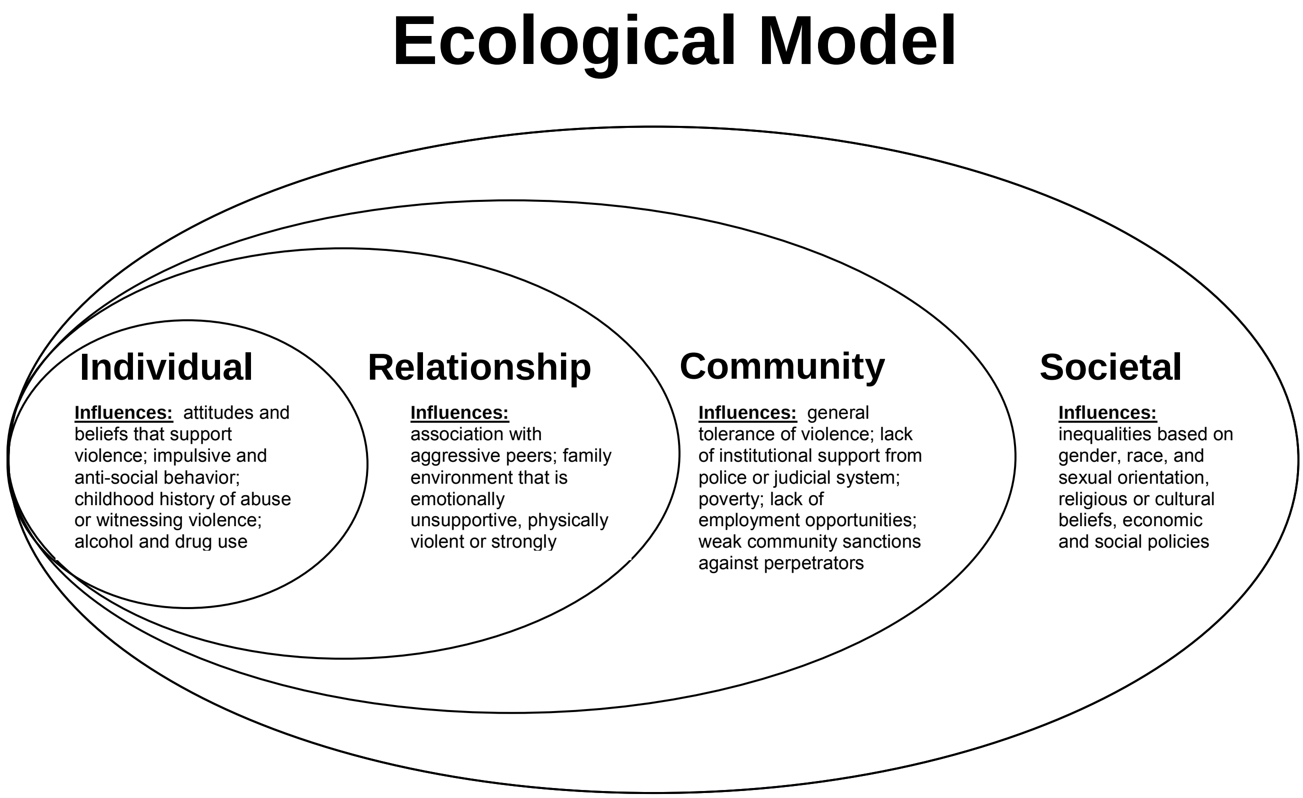
Centers for Disease Control and Prevention 1600 Clifton Rd. Atlanta, GA 30333, USA
800-CDC-INFO (800-232-4636) TTY: (888) 232-6348 - Contact CDC–INFO

A Public Health Approach to Preventing Child Abuse and Neglect

The Ecological Model

The Ecological Model and Risk/Protective Factors (adapted from World Report on Violence and Health (Jewkes, Sen, Garcia-Moreno, 2002)



Level of Social Ecological Model Addressed - The Social Ecological Model is a comprehensive public health approach that not only addresses an individual's risk factors, but also the norms, beliefs, and social and economic systems that create the conditions for child maltreatment to occur.

- *Individual level influences* are biological and personal history factors that increase the likelihood of an individual becoming a victim or perpetrator of violence. For example, factors such as alcohol and/or drug use; attitudes and beliefs supportive of child maltreatment; impulsive and other anti-social tendencies. Interventions for individual-level influences are often designed to affect an individual's social and cognitive skills and behavior, and include approaches such as counseling, therapy, and educational training sessions (Powell et al., 1999).

- *Interpersonal relationship level influences* are factors that increase risk as a result of relations with peers, intimate partners, and family members. A person's closest social circle – peers, partners and family members – have the potential to shape an individual's behavior and range of experience (Dahlberg et al., 2002). Interventions for interpersonal relationship level influences could include family therapy, bystander intervention skill development, and parenting training (Powell et al., 1999).

- *Community level influences* are factors that increase risk based on community and social environments in which an individual has experiences and relationships such as schools, workplaces, and neighborhoods. For example, lack of enforcement of child maltreatment laws in a community can send a message that child maltreatment is tolerated, and there may be little or no consequences for those who perpetrate violence against children.

  Interventions for community level influences are typically designed to impact the climate, systems and policies in a given setting.

- *Societal level influences* are larger, macro-level factors that influence child maltreatment such as religious or cultural belief systems, societal norms, and economic or social policies that create or sustain gaps and tensions between groups of people.

  Interventions for societal level influences typically involve collaborations of multiple partners to change laws and policies related to child maltreatment. Another intervention would be to determine societal norms that accept violence and identify strategies for changing those norms (Powell et al, 1999).

HIPAA Information and Training

HC Pro Healthcare Marketplace
www.hcmarketplace.com

Recording of Indian Health Service HIPAA Training, Hosted by The Aberdeen Area IHS; July 24, 2012
https://ihs.adobeconnect.com/_a1137116237/p2dgvk3oxvs/?launcher=false&fcsContent=true&pbMode=normal

Information from the Indian Health Service
http://www.ihs.gov/hipaa/

Some Questions to Ask When Assessing a Data Source

1. What is the quality of data?
2. Are the data computerized or must they be manipulated manually?
3. What period of time do the records span?
4. How often are data collected: annually, monthly, continuously, periodically?
5. Are the data disseminated regularly?
6. How are data disseminated?
7. Are the data available on the internet or CD-ROM?
8. What is the most recent year of available data?
9. Is there a report available with the latest results?
10. Is reporting of data voluntary?
11. How complete is the data?
12. How much time is there between the date of the injury and its availability for surveillance purpose?
13. Is there a code book that defines variables and coding of variables?
14. Are analyses available on request?
15. Can custom tabulation be done?
16. Is access to original documents possible?
17. Are there any restrictions on access to records?
18. Is a memorandum of understanding required for access?
19. Is there a fee for the data?
20. To what level of geographic specificity are the data available: national, regional, state, county, city, census tract, zip code?
21. What type of data is obtained: mortality, morbidity, incidence, prevalence, nature of injury, severity of injury, body region affected, treatment, length of hospitalization, level of impairment or disability, expected source of payment, cost/charge information, surgical and medical procedures performed?
22. What demographic information is available: age (actual years or group categories), date of birth, sex, race, ethnicity, marital status, occupation, industry, education, income, place of residence? When is information collected?
23. What data are available on the circumstances surrounding the injury event: date of injury, time of injury, place of occurrence (home, school, work), intent, product involved, type of weapon involved, and external cause of injury code?
24. What activities were associated with the injury: sports, work, day care, boating, home, recreation, farm, domestic violence, child neglect or abuse?
25. Is a narrative description available?
26. Area data included on contributing behaviors: seatbelt use, airbag installation, smoke detector installation, drug and alcohol involvement, riding with a drinking driver, bicycle helmet use, motorcycle helmet use, protective equipment for sports, unsupervised swimming, swimming pool fencing, swimming ability, firearm storage, weapons carrying, physical fighting, mental health treatment, previous suicide attempt?
27. What other barriers are there to the use of these data?

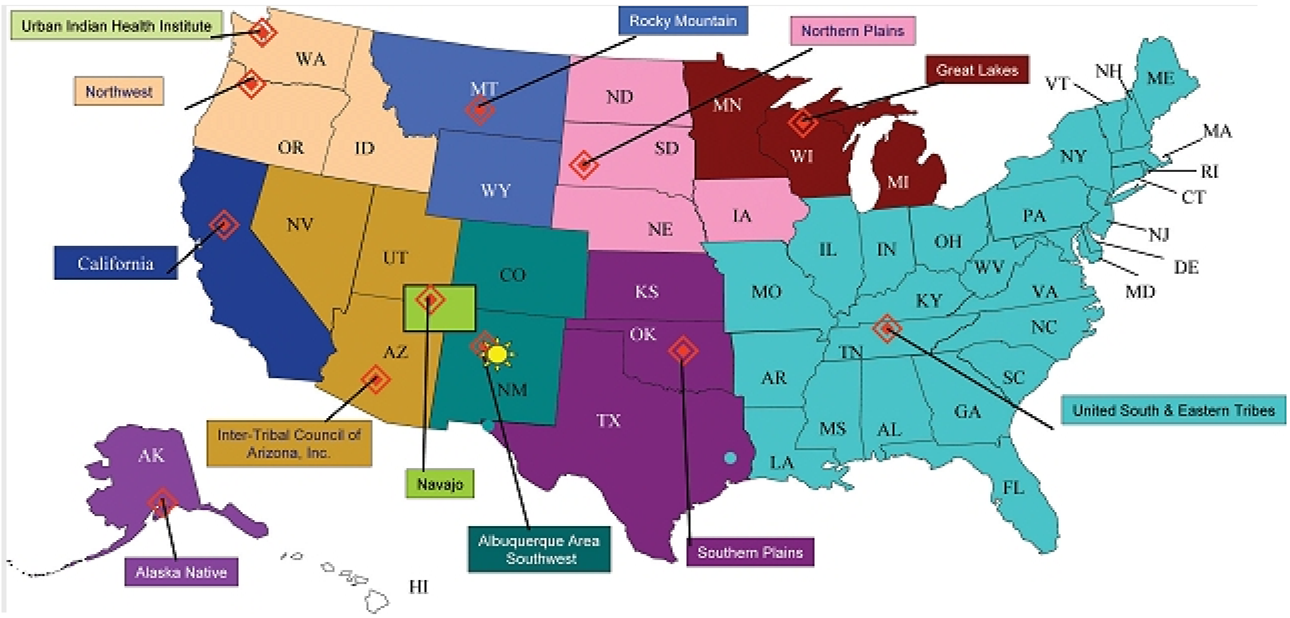
Matrix of Data Sources

Data Source	Description
National Electronic Injury Surveillance System (NEISS) http://www.cpsc.gov/library/neiss.html	• Consumer Product Safety Commission • Product related injury • National sample of EDs • Estimates of ~15,000 product-related injuries • Online queries • No race/ethnicity data
National Vital Statistics System http://www.cdc.gov/nchs/nvss.htm	• National Center of Health Statistics • Deaths and births • Focus on policies/procedures of state reporting
Web-based Injury Statistics Query & Reporting System http://www.cdc.gov/ncipc/wisqars/	• CDC-NCIPC • Fatal & Non-Fatal Injury • Online queries • AI/AN data fatal only
National Hospital Discharge Survey http://www.cdc.gov/nchs/about/major/hdasd/nhdsdes.htm	• National Center of Health Statistics • National sample of ~500 non-federal hospitals • No race/ethnicity data
National Health Interview Survey http://www.cdc.gov/nchs/about/major/nhis/quest_data_related_doc.htm	• National Center of Health Statistics • Questions incorporated in US Census interviews • Focus on 15 health measures, including injury & poisoning
National Ambulatory Medical Care Survey http://www.cdc.gov/nchs/about/major/ahcd/ahcd1.htm	• National Center of Health Statistics • National sample (interviews) of private physician offices • Focus on patient demographic characteristics and services provided
National Hospital Ambulatory Medical Care Survey http://www.cdc.gov/nchs/about/major/ahcd/nhamcsds.htm	• National Center of Health Statistics • National random sample of hospital ED & outpatient • Hospitals complete custom patient treatment forms • Focus on patient demographic characteristics and services provided.

Fatality Analysis Reporting System (FARS) http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/FARS/809-726/pages/page1.htm http://www-fars.nhtsa.dot.gov/	• National Highway Traffic Safety Administration • Motor vehicle traffic deaths • On-line queries and standard reports • Race/ethnicity included since 2001
National Occupant Protection Use Survey (NOPUS) http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/RNotes/2001/00-035.pdf	• National Highway Traffic Safety Administration • Random observational seat belt survey • Shoulder belt use: drivers; right front passengers
Uniform Crime Reporting System http://www.fbi.gov/ucr/05cius/	• Federal Bureau of Investigation • Annual publication
Other National Data Resources: • National Incident-based Reporting System • National Crime Victimization Survey • National Child Abuse and Neglect Data System • Nation Incidence Study of Child Abuse and Neglect • Behavioral Risk Factor Surveillance System • Youth Risk Behavior Surveillance System •	**State & Local Data Resources:** • Vital Statistic & Death Certificate Data • Medical Examiner & Coroner Reports • National Violent Death Reporting System • Hospital Discharge Data • Trauma Registries • Emergency Medical Services Data • Emergency Department Data • Physician Office Visit Data • Police Reports • Fire Reports • School Reports • Child Protective Services • Poison Control Center Data • Child Death Review Teams

Source: Injury Prevention and Public Health; pg. 330-350

Tribal Epidemiology Centers (TECs)



Currently there are 12 TECs throughout the country. Below is a list of contact information for those Tribal Epidemiology Centers.

	Alaska Native Epidemiology Center Director: Ellen Provost, DO, MPH Phone: (907) 729-4567
	Albuquerque Area Southwest Tribal Epidemiology Center Director: Kevin English, RPh, MPH Phone: (505) 962-2602

	California Tribal Epidemiology Center Director: Kristal Chichlowska, Ph.D. Phone: (916) 929-9761
	Great Lakes Inter-Tribal Epidemiology Center Director: Kristin Hill, MSHSA Phone: (715) 588-3324
	Inter-Tribal Council of Arizona Tribal Epidemiology Center Acting Director: Jamie Ritchey, PhD, MPH Phone: (602) 258-4822
	Navajo Epidemiology Center Director: Ramona Antone Nez Fax: (928) 871-6254

	Great Plains Tribal Epidemiology Center Acting Director: Sunny Colombe Phone: (605) 721-1922
	Northwest Tribal Epidemiology Center Director: Victoria Warren-Mears, Ph.D. Phone: (503) 228-4185
	Rocky Mountain Tribal Epidemiology Center Acting Director: Folorunso Akintan, MD,MPH Phone: (406) 252-2550
	Southern Plains Tribal Epidemiology Center Director: Tom Anderson Phone: (405) 951-6024
	United South and Eastern Tribes Epidemiology Center Senior Epidemiologist: John Mosely Hayes, DrPH Phone: (615) 872-7900

Urban Indian Health Institute Epidemiology Center
Director: Crystal Tetrick
Phone: (206) 812-3030

Medical Record Number: ____________________

Bristol Bay Area Health Corporation
Injury Prevention Program
Severe Injury Surveillance Data

Date of Injury:_________________

Community where Injury Occurred:		Community of Residence:	
Aleknagik	Manokotak	Aleknagik	Manokotak
Chignik Bay	Naknek	Chignik Bay	Naknek
Chignik Lagoon	New Stuyahok	Chignik Lagoon	New Stuyahok
Chignik Lake	Newhalen	Chignik Lake	Newhalen
Clark's Point	Nondalton	Clark's Point	Nondalton
Dillingham	Olsonville	Dillingham	Olsonville
Egegik	Pedro Bay	Egegik	Pedro Bay
Ekuk	Perryville	Ekuk	Perryville
Ekwok	Pilot Point	Ekwok	Pilot Point
Goodnews Bay	Platinum	Goodnews Bay	Platinum
Igiugig	Port Heiden	Igiugig	Port Heiden
Iliamma	Portage Creek	Iliamma	Portage Creek
Ivanof Bay	South Naknek	Ivanof Bay	South Naknek
Kanatak	Togiak	Kanatak	Togiak
King Salmon	Twin Hills	King Salmon	Twin Hills
Kokhanok	Ugashik	Kokhanok	Ugashik
Koliganek		Koliganek	Alaska
Levelock		Levelock	Out

Alcohol Involved: Yes No

Nature of Injury:____

Race: BEN NON **Sex**: Male Female **Age**:________

Severity of Injury: Investigated Transport Admit Medevac Death ER

How it Happened: ATV Assault Bite Drowning ETOH Fall
Fire/ Burn MV Sno Go Suicide Other

Narrative: ____
____
____
____
____
____

12743

Employee ID | SU Where Entered | SU of Occurrence | Community of Occurrence | Community of Residence

Severity
- O Hospitalized
- O Fatal

Gender
- O Male
- O Female

DOB __ / __ / ____

Age In Years

Infant Age In Months

Date of Visit __ / __ / ____

North GPS Coordinates .

West GPS Coordinates .

Transported in by EMS
O Yes O No

Road Type
- O US Highway
- O Interstate
- O County Road
- O State
- O BIA/NN/NR/IR
- O City

Road Number/Name

Time of Event
- O 12am-6am
- O 6am-12pm
- O 12pm-6pm
- O 6pm-12am

Transferred
- O Yes
- O No

Mile Post

Cause
- O Assault
- O Hot Liquid Burn
- O Environment
- O Poison / ETOH
- O Fall
- O Rodeo / Livestock
- O Fire Burn
- O Suicide
- O MVC
- O Other

Intent
- O Unintentional
- O Undetermined
- O Self-inflicted
- O Other
- O Assault

E-Code .

Nature of Injury
- O Head Injury
- O Dislocation
- O LOC
- O Fracture
- O Skull fracture
- O Crushing injury
- O Subdural hematoma
- O Amputation/evulsion
- O Concussion
- O Contusion
- O Eye Injury
- O Puncture
- O Hemorrhage
- O Laceration
- O Hypothermia
- O Burn
- O Suffocation
- O Cellulitis/Infection
- O Poison Injury
- O Multiple
- O Gunshot
- O Other

Occupant Protection
- O Seat Belt
- O None
- O Car Seat
- O Unknown
- O Helmet
- O Not Applicable

Alcohol Involved
- O Involved/Related
- O No
- O Unknown

Blood Alcohol Level mg/dL

BAL of 0.1%=100
0.2%=200

Methamphetamines Used
O Yes O No O Unknown

Description of Injury Event

PRIMARY DATA

Whiteriver Service Unit OEHE
Severe Injury Surveillance Data

Note: For all variables, U=Unknown Z=Unspecified and N/A=Not Applicable

Sex:___ DOB:__________ Age*:_______ Chart #:____________________

Community of Residence:____________ WMAT Member:________ Ft. Apache Reservation Resident:________

Date of Visit:__________ Day of Week:__________________ Time*:________(24Hr.) Year:_________

Severity:_______ A=Hospitalized B=Fatal LOS*:________ Est. Cost: $________

Nature of Injury:____

____

N-Code1:___________ N-Code2:___________ N-Code3:___________ (NOTE: N-Codes 800-999.9 Only)

External Cause of Injury: ☐ Assault ☐ Drown ☐ Fall ☐ Fire/Burn ☐ MVC ☐ Other ☐ Suicide

E-Code: E__________ Describe Injury Event:____

____

____

____

Indication of alcohol (ETOH) involvement in this injury?______

ETOH determination based on:_______

A. Patient Reported
B. BAC Test
C. Medical provider reported in chart
D. Police Report/DUI
E. Combination of two or more A-D

ETOH Quantity (mg/dl)*:_______ Note: BAC units are g/dl and must be converted to mg/dl.(.10 g/dl = 100 mg/dl)

Indication of other (illegal) drug?______ If Yes, what drug(s)?______________________________

Patient transferred from WRSU?____ If Yes, to which facility?______________________________

Mode of transfer:_____ 1=EMS 2=Native Am. Air Ambulance 3=Air Eagle/Evac 4=POV

* These fields only, leave blank if unknown/unspecified.

Rev. 12/2000

SUPPLEMENTAL DATA
DROWNING INJURIES

Whiteriver Service Unit OEHE
Severe Injury Surveillance Data

Note: For all variables, U=Unknown Z=Unspecified and N/A=Not Applicable

Did the victim know how to swim?________

Was the victim alone?_______

Community where drowning/near drowning occurred:________

Body of water involved:________

A. Bathtub
B. River
C. Lake
D. Tank/Pond
E. Ditch
F. Swimming Pool
G. Flooded Wash/Flood
H. Container/bucket
I. Other body of water:________________

Watercraft involved:________

A. None
B. Motorboat
C. Sailboat
D. Rowboat
E. Canoe/Kayak
F. Motorized raft
G. Nonmotorized raft
H. Other craft:__________________

Preventive gear available: (1)______ (2)______ (3)______

A. Lifeline
B. Any PFD
C. Unsinkable boat
D. Fenced area
E. Warning signs
F. None
G. Other preventive gear:______________

Rev. 12/2000

SUPPLEMENTAL DATA
FALL INJURIES

Whiteriver Service Unit OEHE
Severe Injury Surveillance Data

NOTE: For all variables, U=Unknown Z=Unspecified and N/A=Not Applicable

Fall Type:________
A. Same Level
B. Different Level

Approximate number of feet of fall*:______(Note: Enter 0 for same level falls)

Community where fall occurred:______________

Same level falls:

(Inside)
A. Bathtub
B. Other bathroom
C. Other home inside
D. Public building
E. Private building
F. School

(Outside)
G. Other home outside
H. Walking/hiking
I. Playground
J. Sports field
K. Sidewalk
L. Street
M. Other Same Level:________________

Different Level falls:___
A. Stairs inside
B. Stairs outside
C. Home yard
D. Bicycle
E. Playground equipment
F. Window
G. Roof
H. Tree
I. Wall, cliff or other natural drop-off
J. Ladder
K. Fell off horse/animal
L. Other Different Level:________________

* For this field only, leave blank if unknown/unspecified.

Rev. 12/2000

SUPPLEMENTAL DATA
FIRE/BURN INJURIES

Whiteriver Service Unit OEHE
Severe Injury Surveillance Data

Note: For all Variables, Z=Unknown Uns=Unspecified and N/A=Not Applicable

Place of fire:______

A. Home
B. Car
C. Outdoors
D. Other place:________________

Community where fire/burn injury occurred:_____________

If home, location of victim:______

A. Bedroom
B. Living room
C. Bathroom
D. Kitchen
E. Other home location:_______________

Number of door exits in home*:______

Was patient sleeping:_____

Ignition or heat origin:____

A. Cigarette
B. Kitchen stove
C. Woodstove/fireplace
D. Kerosene heater
E. Other heater
F. Chimney
G. Electrical wiring
H. Open pit fire
I. Outdoor grill (gas/charcoal)
J. Gasoline
K. Propane (other than outdoor grill)
L. Home appliance
M. Matches/lighter
N. Water heater
O. Food or drink
P. Bath/shower/tap water
Q. Other ignition/heat source:________________

Material first ignited:_____

A. Chair or sofa
B. Bed
C. Loose papers
D. Clothing
E. Drapes
F. Carpet
G. Cooking grease
H. Skin area
I. Other material:____________________

Was a smoke detector installed?____ If installed, was the smoke detector operational?____

If installed and operational, did the smoke detector sound an alarm?____

Smoke detector type:_____ A=Battery B=Hardwired C=Combination

Was an operational fire extinguisher available?_____ If yes, was the extinguisher used?_____

* For this field only, leave blank if unknown/unspecified.

Rev. 12/2000

SUPPLEMENTAL DATA
MOTOR VEHICLE INJURIES

Whiteriver Service Unit OEHE
Severe Injury Surveillance Data

NOTE: For all variables, U=Unknown Z=Unspecified and N/A=Not Applicable

---

Roadway:________
A. AR1 (River Rd.)
B. AR12 (Cibecue Rd.)
C. AR44 (Sawmill Rd.)
D. AR45 (Stago Rd.)
E. AR46 (7-Mile Rd.)
F. AR55 (East Fork Rd.)
G. AZ73
H. AZ260
I. AZ273 (Sunrise)
J. AZ473 (Hawley Lake)
K. US60
L. Other:________________

Road Jurisdiction:_______
A. Tribe
B. BIA
C. State
D. Private
E. Other:______________

Mile Post* #:______ If no MP#, describe location:________________________________

Community where MVC occurred:________________

Road Type:_______
A. Unpaved
B. Single lane, paved
C. Two lane, paved
D. Divided Highway
E. Other:________________

Road Design:________
A. Curved
B. Straight
C. Hill
D. Other:______________

Injured person was:________
A. Driver of motor vehicle
B. Occupant of motor vehicle
C. Pedestrian struck by motor vehicle
D. Bicyclist struck by motor vehicle
E. Other:______________________

Was this incident:_______
A. Single vehicle incident
B. Multiple vehicle incident

Injured person was driver/occupant of:______
A. Automobile
B. Pickup Truck
C. Truck (1+ton)
D. Farm Veh. (tractor, etc.)
E. Motorcycle
F. ATV, 3 Wheeler
G. ATV, 4 Wheeler
H. Snow Machine
I. Bicycle
J. Other:____________ (e.g., Van, SUV, Bus)

(Y/N) Did the crash involve vehicle roll over: ________ collision with fixed object: ________ collision with animal in road: ________ person thrown/fell from vehicle: ________

If multiple vehicle incident, damage to injured's vehicle was to:________ A. Front B. Side C. Rear

If mult. veh. incident, other veh. involved was:______
A. Automobile
B. Pickup Truck
C. Truck (1+ton)
D. Farm Veh. (tractor, etc.)
E. Motorcycle
F. ATV, 3 Wheeler
G. ATV, 4 Wheeler
H. Snow Machine
I. Bicycle
J. Other:____________ (e.g., Van, SUV, Bus)

Was Pedestrian or Bicyclist:________
A. Crossing at intersection
B. Crossing elsewhere
C. Walking/riding with traffic
D. Walking/riding against traffic
E. Hit by vehicle that came off road
F. Lying in road
G. In parking lot
H. In residential driveway
I. Other:____________________

Signals:_______ A. None B. Flashing warning C. Red, Yellow, Green D. Stop sign E. Yield sign F. Other:____________________

Lighting:_______
A. Daylight
B. Dark
C. Dark but lighted
D. Dawn/Dusk

Visibility:______
A. Rain
B. Fog
C. Clear
D. Snow/Sleet
E. Other:________

Road Conditions:_______
A. Dry
B. Wet
C. Snowy/Icy
D. Clear
E. Other:_______

Protection:________ A. Seat belt B. Child Restraint C. Helmet D. None E. Other:__________

Number persons injured in crash: ER only*:______ Hospitalized*:__________ Fatal*:__________

∗ For this field only, leave blank if unknown/unspecified.

Rev. 12/2000

SUPPLEMENTAL DATA
OTHER INJURIES

Whiteriver Service Unit OEHE
Severe Injury Surveillance Data

Note: For all variables, U=Unknown Z=Unspecified and N/A=Not Applicable

Community where injury occurred:____

Type of energy that caused the damage to the person:____

A. Mechanical/Physical (e.g., animal bite, crushing injury)
B. Heat/Lack of heat (e.g., exposure)
C. Chemical (e.g., poisoning)
D. Electrical

What conveyed the energy: (Be specific):______________________________
____
____

SUPPLEMENTAL DATA
SELF INFLICTED & SUICIDE INJURIES

Whiteriver Service Unit OEHE
Severe Injury Surveillance Data

NOTE: For all variables, U=Unknown Z=Unspecified and N/A=Not Applicable

Where did the attempt occur:__________

A. Residence
B. Jail
C. Other public building or business
D. Outdoors
E. Elsewhere:______________

Community where attempt occurred:________

Weapon used:____

A. Gun
B. Knife
C. Other sharp instrument
D. Carbon monoxide
E. Prescription drug
F. Other drug (non-prescription)
G. Poison
H. Rope
I. Jump
J. Other weapon:______________

If weapon was a drug (prescription/non-prescription), were multiple drugs used?_______(Y/N)

If multiple drugs, how many drugs*:______

If weapon was a drug (prescription/non-prescription), what drug name(s)?

(1)__________________ (2)________________ (3)________________ (4)______________________

Circumstances:_____

A. Physical illness
B. Diagnosed mental illness
C. Mimicking real/TV/fictional event
D. Financial loss
E. Social/emotional rejection
F. Unwanted pregnancy
G. Other circumstances:________________

Social context: _______

A. Isolation
B. In company of others

Previous attempts:____ (Y/N)   Number of previous attempts*:_____(enter 0 if no previous attempt)

Behavioral Health involvement indicated: ______(Y/N)

Social Services involvement indicated: ______(Y/N)

Other referral involved:______(Y/N)   If Other referral, what (e.g., police, substance abuse):_____

∗ For these fields only, leave blank if unknown/unspecified.

Rev. 12/2000

Injury Surveillance
Bristol Bay Area Health Corporation
Environmental Health Injury Prevention Program

I. Track trooper press releases, news stories and public knowledge for serious injuries especially injury death
  A. Complete surveillance sheet for each injury

II. Monthly review ER Log for injury
  A. Complete surveillance sheet for each injury
  B. Complete medical record request and review record for each injury that circumstances and mechanism of injury are not readily apparent

III. Refer any visits that may be associated with behavioral problems to Behavioral Health for review (ie. <21 ETOH, suicide ideation, etc.)

IV. Refer any dog bites not properly reported to Environmental Health personnel

V. Complete Level IV report
  A. Refer most severe/complicated trauma case for month to Level IV committee for review

VI. Place death, medevac, hospital admits, ambulance or air transports and dog bites in Epi Info. Database

VII. Quarterly complete Performance Improvement report for Injury Prevention/Level IV

VIII. Share, generate reports, plan programs, publicize, support grants, evaluate, etc. (with in the bounds of HIPPA mandated confidentiality)

IX. ASAP after FY end, prepare latest 5yr. graphs of injury and alcohol involvement for informational and publicity purposes *(added 7/27/10)*

GUIDELINES FOR THE DEVELOPMENT AND MAINTENANCE OF AN INJURY SURVEILLANCE SYSTEM

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
INDIAN HEALTH SERVICE
OFFICE OF ENVIRONMENTAL HEALTH AND ENGINEERING
DIVISION OF ENVIRONMENTAL HEALTH
ENVIRONMENTAL HEALTH SERVICES BRANCH
INJURY PREVENTION PROGRAM

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GUIDELINES FOR THE DEVELOPMENT AND MAINTENANCE OF AN INJURY SURVEILLANCE SYSTEM

I. INTRODUCTION

The successful prevention of injuries can only be accomplished if the specific agents of severe injury are identified; if there are financial resources to effect modifications in the agents and the environment; and if there are regulations/requirements that mandate certain changes, including behavior in some cases.

These guidelines outline the mechanism for identifying those specific agents of severe injury which are necessary for establishing a sound epidemiological base for injury prevention activities. Although these guidelines promote a two phase system for injury surveillance, their purpose should by no means be construed as advocating a reduction in existing injury surveillance activities. For example, if a service unit/service area has the resources and is currently operating a full scale severe injury surveillance system (with complete investigations of all severe injuries), these guidelines do not advocate a reduction of these activities to the Phase I Injury Surveillance process described below. These guidelines have been written to assist the service units/service areas that do not have the resources to fully investigate all severe injuries but who do want to confront the severe injury problem as efficiently as possible with existing resources.

II. PURPOSE

The purpose of this document is to describe the procedures necessary to develop an injury surveillance system which will allow the injury prevention practitioner to:

1. identify populations at high risk for injuries,
2. identify necessary and contributing factors to injuries,
3. plan a community or service unit/service area-specific injury prevention program, and
4. monitor changes in mortality and morbidity in the target population over time.

An injury surveillance system is considered to be an integral component of any injury prevention program rather than a one-time effort.

The incorporation of injury surveillance into the injury prevention program effort will enhance approaches to injury prevention and ultimately lead to the successful reduction in injury rates.

The actual exercise of gathering epidemiological information about injuries can be a very fulfilling and stimulating endeavor. One will finally be able to humanize all of those statistics that heretofore may have seemed like random numbers. You may have been challenged in the past to work in the emergency room or with emergency medical services teams to gather first-hand knowledge of the real trauma of injuries. Upon becoming involved firsthand in the process of injury surveillance, you will find yourself even more entrenched in your commitment to prevent this most preventable of "diseases"-- injuries!

III. PROCESS

The severe injury surveillance process involves two phases of implementation. Phase I Injury Surveillance is a process by which very basic information about severe injuries is obtained and tabulated. Phase II Injury Surveillance is a much more in-depth process during which very specific information about specific injury types is gathered through field investigation.

A. PHASE I INJURY SURVEILLANCE

1. Responsibility

Although a wide variety of personnel; including physicians, nurses, medical records technicians, contract health services clerks, emergency medical services personnel, and others; should be involved in the injury surveillance process, the lead role at the local level will rest with the service unit/service area Injury Prevention Coordinator (IPC). It is the responsibility of this individual to initiate and sustain the injury surveillance process. Severe injury data that is collected by the IPC is sent to the IHS Area Injury Prevention Specialist (IPS) for computerization and analysis.

2. Base Line Data Analysis

An important initial effort in establishing an injury surveillance system is to conduct an analysis of existing injury information to establish base line injury data. A base line injury data analysis should include a description of the leading causes of injury mortality and morbidity. An example of a base line injury mortality and morbidity analysis is included as Appendix 1. This information will give the injury prevention practitioner the necessary background to approach the establishment of an injury surveillance system in a more knowledgeable manner.

The Indian Health Service (IHS) Area IPS can provide injury mortality and morbidity data sorted by Area and service unit/service area. This data will reflect all IHS/tribal and contract health care provided.

3. <u>Case Selection Criteria</u>

a. **Injury Types**

According to noted injury prevention expert, Dr. Leon Robertson:

"Initially, at least, attention should be concentrated on injuries selected by severity. Too much time and energy can be depleted trying to prevent trivial cuts and bruises while injuries that kill and hospitalize are neglected. It is recommended that the supplemental data forms be completed on <u>all</u> fatal and hospitalized cases, but <u>only</u> on ambulatory cases that involve fractures or loss of consciousness. Perhaps when the more severe injuries have been brought under greater control, a wider net can be cast."

It is recommended that only severe injuries should be selected for Phase I Injury Surveillance. Severe injuries shall be considered to be fatalities, hospitalizations, losses of consciousness, and ambulatory fractures. However, if resources permit or if injury research dictates that all injuries of a specific type (i.e. burns) be investigated, Phase I Injury Surveillance may be expanded to include less than severe injuries.

b. **Sources of Information**

Where IHS/Tribal health care is provided, the most obvious source of patient injury information is the medical records department of a hospital or clinic. Ideally, a working relationship should be developed with the medical records department whereby they routinely "flag" patient charts when trauma meeting the injury severity criteria occurs. Emergency room logs, emergency medical services patient transport and transfer logs, and law enforcement data could also be used as sources of data.

Where contract health care is utilized, severe injury information should be obtained from contract health care providers, state coroners' offices/vital records branches, and by "word of mouth". A sample letter to a state vital records branch, that describes the rational and justification for requested death certificate information, is included as Appendix 2. Service units/service areas must authorize all contract health care provided and will therefore have names and other information on injuries that occur. Contract health care situations pose a much more challenging task for the injury prevention coordinator than direct health care settings. Ideally, working agreements should be developed with contract health care providers whereby these individuals routinely assign E codes (or sufficient narrative information from which an E code can be assigned by the IHS Area IPS) to all injuries that they treat. Death certificates are customarily assigned E codes.

4. <u>Chart Review</u>

Injury cases are further researched through patient chart reviews and health care provider/patient interviews, if necessary, in order to gain enough information whereby the Area IHS IPS can assign E codes to injuries.

Adequate information would include:

a. a basic description of what type of injury occurred,
b. how did the injury occur, and
c. where did the injury occur.

This information is recorded in narrative form, along with other basic patient information, on the Indian Health Service Injury Prevention Program Severe Injury Surveillance Data - Phase I Form (see Appendix 3).

Indian Health Service employees (who have been authorized by their Service Unit Director or Administrative Officer) and tribal health program employees (who have been authorized by their tribal Health Program Director) have the right and privilege to review medical care information that is necessary to the mission of the IHS, to raise the health status of American Indians and Alaska Natives to the highest possible level. This information is critical to the injury prevention effort and it must be maintained in strictest confidentiality. (See Appendix 4 for more information on the Privacy Act).

In contract health care cases, patient chart reviews will probably not be possible. Contract health care facilities should send discharge summaries to IHS/tribal health programs. In cases where a severe injury has been identified but there is no way to review formal, written information on this injury, the only recourse may be to conduct an interview of the injury victim (or family member of the injury victim) to gain the information that is necessary. This information is also recorded on the Indian Health Service Injury Prevention Program Severe Injury Surveillance Data - Phase I Form. If E Code information can be obtained from contract health care providers, no other effort by the service unit/service area Injury Prevention Coordinator is necessary except for the forwarding of this information the IHS Area IPC.

All completed Severe Injury Surveillance Data - Phase I Forms should be sent by the service unit/service area IPC to the IHS Area Injury Prevention Specialist.

5. **Assignment of E Codes and Computerization of Data**

All completed Severe Injury Surveillance Data - Phase I Forms received by the IHS Area IPS will be assigned with E codes based on the information contained within the narrative section of the form. The IHS Area IPS will then enter all information on these forms into Epi Info. Epi Info is a series of computer programs used to analyze data and perform other common epidemiologic tasks.

6. **Analysis of E Code Data and Generation of Reports**

The IHS Area IPS will conduct at least a quarterly analysis of all severe injury data that has been recorded in Epi Info. The IPS will generate IHS Area-wide and service unit/service area reports based on this analysis. These E code based reports will then be forwarded to the service unit/service area IPCs. It is at this point that Phase II Injury Surveillance may be implemented, if warranted.

B. **PHASE II INJURY SURVEILLANCE**

1. **Determination of Applicability**

Based on IHS Area-wide and service unit/service area E code reports, the IHS Area IPS will consult with the service unit/service area IPC to determine the applicability of initiating Phase II Injury Surveillance. These E code reports will yield information that will allow these individuals to determine specific severe injury types that warrant further investigation. The following is an example where further investigation would be warranted:

> It may become apparent that injuries with an E code of E814.7 are quite prevalent in specific service units/service areas. The code E814.7 denotes a motor vehicle collision with a pedestrian where the pedestrian has been injured.
>
> Based on this information, the aforementioned individuals come to the conclusion that further information should be collected (within the specified service units/service areas) for all pedestrian injuries due to collisions with motor vehicles. It will be at their discretion to determine whether these investigations should be retrospective, prospective, or both. These investigations will, in turn, yield valuable information to initiate injury prevention intervention activities.

2. **Case Selection Criteria**

Depending upon whether it has been decided that Phase II Injury Surveillance will be retrospective, prospective, or both, one or both of the following will occur:

a. The IHS Area IPS will generate a report by patient chart/identification numbers, of all target E Code injuries, for further investigation (retrospective cases), and/or

b. Medical records and contract medical clerks (and any other sources of information that have been used to identify injury cases) will be alerted to flag the specific types of injuries that have been identified for further investigation (prospective cases).

3. **Chart Reviews**

Injury cases are further researched through patient chart reviews and health care provider/patient interviews. As with Phase I Injury Surveillance, patient chart reviews for contract health care situations are probably unrealistic. Once again, an interview of the injury victim (or a family member of the injury victim) may be the only recourse to obtain the information that is necessary. The information gathered through this process is recorded on the appropriate Indian Health Service Injury Prevention Program Severe Injury Surveillance Data - Phase II Form. There are seven possible forms; there are forms for motor vehicle, fire/burn, falls, drowning, assault, suicide, and "other severe" injuries (see Appendix 5).

The Privacy Act information discussed under Phase I Injury Surveillance "chart review" also applies to Phase II Injury Surveillance. All medical care information obtained during any injury prevention efforts must be maintained in strictest confidentiality.

4. **Field Investigations**

The third (and very crucial) step to Phase II Injury Surveillance is a field investigation. Field investigations should be conducted for all severe injuries identified for Phase II Injury Surveillance. The purpose of the field investigation is to accurately reconstruct the severe injury event. This reconstruction and actual site visit are used to identify and recommend specific injury prevention interventions. These interventions are recorded in the "modifications" section of the appropriate Severe Injury Surveillance Data - Phase II Form. A typical field investigation will require approximately fifteen to thirty minutes of actual investigation time.

Upon completion of field investigations, all completed Severe Injury Surveillance Data - Phase II Forms should be forwarded from the service unit/service area IPC to the IHS Area IPS.

5. **Assignment of E Codes and Computerization of Data**

All completed Severe Injury Surveillance Data - Phase II Forms received by the IHS Area IPS will be processed in the same manner as Phase I Injury Surveillance information.

6. **Analysis of Data and Generation of Reports**

The IHS Area IPS will conduct analyses, of all Phase II Injury Surveillance data that has been received, on a quarterly basis at a minimum. The IPS will generate service unit/service area reports based on these analyses. These reports will then be forwarded to the service unit/service area IPCs.

7. **Injury Prevention Committee Review**

The service unit/service area IPC will share the analyzed data that has received from the IHS Area IPS with the local Injury Prevention Committee. Upon review, the IPC and the Injury Prevention Committee will evaluate potential injury intervention strategies, suggest a course of action for implementation of these strategies, and establish time frames for such action.

8. **Implementation of Injury Prevention Initiatives**

Based on the recommendations of the service unit/service area IPC and the local Injury Prevention Committee, the end result of the injury surveillance process, that is, the implementation of injury prevention initiatives to reduce severe injury, will be completed.

C. ABOUT SMALL NUMBERS

With the exception of very large service units/service areas with large patient workloads, it may take an extended period of time before injury patterns begin to appear. Due to this reality, service unit/service area IPCs should not concentrate solely on the establishment of a surveillance system and dismiss many of the important programs already underway throughout Indian communities and Alaska Native villages. For example, it is a fact that smoke detectors and child passenger protection devices save lives. These are very important activities that deserve continued support.

However, the establishment of an injury surveillance system enables injury prevention programs to more accurately target their resources to additional specific types of injuries which are taking their toll within their respective service units/service areas.

APPENDICES

Appendix 1

SAMPLE BASE LINE MORTALITY AND MORBIDITY ANALYSIS

______________________ Service Unit/Service Area

MORTALITY

Data from the National Center for Health Statistics, from 1981 through 1985, reveal that death rates due to injuries (176/100,000/year) were higher than those of any other cause (including cancer and heart disease) for American Indian and Alaska Native people. Each year about 1000 Native American people die from injuries. Death rates due to injuries are higher for Native American people than for any other race of people in the United States. Although injury death rates for American Indian and Alaska Native people have declined slightly faster than those for U.S. all races, the overall rates for Native Americans are still nearly three times as great as for U.S. all races. For ages 1 through 44, injuries account for 63% of all deaths that occur to Native American people. The average age of American Indian and Alaska Native people who die due to injuries is 27 years. The Years of Premature Life Lost (YPLL), due to injury deaths to Native American people (30,000 per year), are greater than those for cancer and heart disease combined.

Over 50% of all injury deaths to Native American people in 1981 through 1985, who resided in ________________ (State or region), occurred to people aged 15 through 34. This percentage was similar for both males and females. Males aged 15 through 24 are in a very high risk group for injury death. Unintentional injury deaths are much more likely than intentional injury deaths among Native American females residing in __________ (State or region). But among Native American males who reside in __________________ (State or region), intentional injury deaths are more common in some age groups. In fact, they account for over half of the injury deaths among males aged 15 through 24. Over 65% of unintentional injury deaths that occurred to Native American people residing in ____________________ (State or region) were motor vehicle related. Most intentional injury deaths occurring to people residing in ___________________ (State or region) were homicides and suicides that involved the use of firearms.

(This paragraph should contain mortality information similar to the previous two, as available and appropriate, that is specific for the local service unit/service area for which an injury surveillance system is being developed.)

MORBIDITY

Nationally, almost 80,000 days are spent in Indian Health Service and contract hospital beds by 10,000 to 12,000 persons who require care for severe injuries. Over one-third million out-patient visits are made to health care facilities each year by Native American people seeking treatment for injury. More than $70 million is spent annually for transportation and treatment of American Indian and Alaska Native people who are injured.

Fiscal Year 1988 Ambulatory Patient Care (APC) data for ________ (State or region) revealed that 5,042 of the 89,485 ambulatory care first visits for Native American people occurred because of injuries. The leading external causes of these injuries were falls (1,686), other causes (907), cutting and piercing objects (511), motor vehicles (434), and injuries purposely inflicted by others (286). Over 56% of all reported injuries occurred to Native American people less than 25 years old. This group of people comprise less than 49% of the Native American population in ________________ (State or region). Eight percent (8%) of the 5,042 injuries recorded in FY 1988 were reported to be alcohol related.

(This paragraph should contain morbidity information similar to the previous two, as available and appropriate, that is specific for the local service unit/service area for which an injury surveillance system is being developed.)

Appendix 2

SAMPLE LETTER TO A STATE VITAL RECORDS BRANCH

Ms. Joanne Doe
State Registrar
Vital Records Branch
Division of Health Services
100 Main Street
Some City, Some State 99999

Dear Ms. Doe,

I am contacting you at the suggestion of Mr. John Buck of the State Center for Health Statistics. The United States Public Health Service/Indian Health Service realizes the toll in lives, dollars, and untold human suffering that injuries take in our society. Tragically, the injury death rate for American Indian and Alaska Native people is nearly three times as great as that for U.S. all races. For this reason, the Indian Health Service (IHS) has identified injury prevention as one of its top three priorities. We strongly believe that the successful prevention of injuries can only be accomplished if the specific agents of severe injury are identified. Towards this end, we have developed specific guidelines for an IHS Injury Surveillance System. The goals of this System are fourfold:

1. to identify populations at high risk for injuries,
2. to identify necessary and contributing factors to injuries,
3. to plan community-specific injury prevention programs, and
4. to monitor changes in mortality and morbidity in the target population over time.

In as much as possible, we utilize "in house" data sources to identify injury deaths that occur to Native American people. Unfortunately, in locations where we do not have IHS hospitals and clinics, we know that the documentation of a substantial number of these deaths is not captured by our data sources. It is in an effort to eliminate this shortcoming that we are requesting assistance from your office.

In order to evaluate injury mortality data, I am hereby requesting data tapes containing all death certificate information for

Native American injury deaths that occur in ________________ (State, county, or region). All such information that I receive from you will be handled with strict confidentiality. The names of the deceased will not be published in any form.

Mr. Buck and I have already discussed this request and he has offered to prepare the requested data tapes, with your permission. Mr. Buck has been most helpful and has provided me with priceless technical assistance.

Please feel free to call me at 999/999-9999 if you have any questions or comments regarding my request. Your assistance in this matter is most appreciated.

Sincerely,

I. Needadata
Injury Prevention Specialist

INDIAN HEALTH SERVICE
INJURY PREVENTION PROGRAM
SEVERE INJURY SURVEILLANCE DATA - PHASE I

Service Unit: ___	Community: ____		Chart No. __________
Severity: ___ A = Hospitalized B = Fatal C = Outpatient Visit			
Age: ____	Sex: ___	Date of Visit: ___/___/___	Length of Stay: ____
Nature of Injury: ______________________			N-Code: ________
External Cause of Injury: ______________			E-Code: ________
Describe Injury Event: ______________________________			

INDIAN HEALTH SERVICE
INJURY PREVENTION PROGRAM
SEVERE INJURY SURVEILLANCE DATA - PHASE I

Service Unit: ___	Community: ____		Chart No. __________
Severity: ___ A = Hospitalized B = Fatal C = Outpatient Visit			
Age: ____	Sex: ___	Date of Visit: ___/___/___	Length of Stay: ____
Nature of Injury: ______________________			N-Code: ________
External Cause of Injury: ______________			E-Code: ________
Describe Injury Event: ______________________________			

INDIAN HEALTH SERVICE
INJURY PREVENTION PROGRAM
SEVERE INJURY SURVEILLANCE DATA - PHASE I

Service Unit: ___	Community: ____		Chart No. __________
Severity: ___ A = Hospitalized B = Fatal C = Outpatient Visit			
Age: ____	Sex: ___	Date of Visit: ___/___/___	Length of Stay: ____
Nature of Injury: ______________________			N-Code: ________
External Cause of Injury: ______________			E-Code: ________
Describe Injury Event: ______________________________			

Appendix 4

PRIVACY ACT

Question

What information contained in medical charts of patients (treated by IHS directly or by IHS contractors) can be released to IHS tribal health contract injury prevention employees (PL 93-638 and Buy Indian) for their use in conducting in-depth investigations of the causes of injuries occurring to American Indian and Alaska Native people?

Answer

The requested information is contained in medical records maintained by IHS or IHS contractors. These records are part of the IHS Health and Medical Records Systems, Department of Health and Human Services (DHHS), Health Resources and Services Administration (HRSA), Indian Health Service, 09-15-0019, published in the **Federal Register**, November 24, 1986, pgs. 42497-42502. Contained in this systems notice are routine use disclosures. These are disclosures from the subject records which may be made outside the Department without obtaining prior approval from the subject individual. Routine use number 4 of this system notice reads:

4. Records in part or total may be disclosed to authorized organizations, such as the United States Office of Technology Assessment, or individuals for the conduct of **analytical** and evaluation studies **sponsored by** the IHS (emphasis added).

Since the intent of the Injury Prevention Investigation Program is analytical in nature and is supported financially by the IHS, information concerning injuries occurring to American Indian and Alaska Native patients treated by IHS or contract care providers (outpatient or inpatient information) may be provided to tribal health injury prevention employees for this purpose.

The question then arises as to whether tribal health injury prevention employees may be granted access to:

1. a patient's entire record,

2. only that portion of the record pertaining to the injury under investigation, or

3. may be provided only injury-related information

abstracted from the medical records, but not direct access to (all or part) of the record itself.

It is preferable if tribal health injury prevention employees were to provide a medical record abstraction form to IHS or contract medical records personnel for their completion. This would give maximum protection to the patient in safeguarding his/her confidential information contained in the medical record. Practicality, however, may dictate that the tribal health injury prevention employee be granted direct access to all or part of the medical record due to a shortage of medical record staff or excessive workload. If such is the case, then such access should be granted. Tribal injury prevention employees should be made aware of the restrictions and penalties imposed upon them when they are granted access to medical record information protected by the Privacy Act of 1974 in the possession of the Federal government.

In addition to the information provided to tribal injury prevention employees stated in the previous paragraph, tribal injury prevention employees must be required to:

1. establish reasonable administrative, technical, and physical safeguards to prevent unauthorized use or disclosure of all or part of the record, or information abstracted from the record;

2. remove or destroy the information that identifies the individual at the earliest time at which removal or destruction can be accomplished consistent with the purpose of the project, unless the recipient has presented adequate justification for retaining such information;

3. make no further use or disclosure of the record except:

   a. in emergency circumstances affecting the health or safety of any individual;
   b. for use in another injury investigation project, under these same conditions, and with written authorization of the Department;
   c. for disclosure to a properly identified person for the purpose of an audit related to the injury investigation project if information that would enable patients to be identified is removed or destroyed at the earliest opportunity consistent with the purpose of the audit; or
   d. when required by law;

4. secure a written statement attesting to the program official's appropriate understanding of, and willingness to abide by these provisions.

Additional regulations (Alcohol and Drug Abuse Patient Records Confidentiality Regulations) apply if information contained in a medical record indicates the diagnosis, prognosis, or referral for alcohol or drug abuse. A brief summary of these regulations follow.

CONFIDENTIALITY OF DRUG AND ALCOHOL ABUSE RECORDS

Definition:

> Documentation directly or indirectly identifiable by an individual regarding activities or programs relating to alcohol and drug abuse education, training, treatment, rehabilitation or research including treatment for medical conditions resulting from alcohol or drug abuse.

Records shall be confidential and disclosed only for the purposes and under the circumstances expressly authorized by the patient and shall not be used to initiate or substantiate criminal charges or to conduct any investigation of the patient, except:

1. as authorized by **order** from a court of competent jurisdiction (a subpoena cannot be substituted for a court order);

2. when released to medical personnel in a bona fide medical emergency;

3. when released to qualified personnel conducting scientific research, management audits, or program evaluation provided that direct or indirect identification of any patient is not made in reports of these studies; or

4. when an interchange of records within or among Armed Forces and the Veterans Administration occurs.

In cases of conflict between the Privacy Act and the regulations regarding drug and alcohol abuse disclosure, the regulations regarding drug and alcohol abuse will take precedence.

Violation of these regulations may result in being found guilty of an misdemeanor with a possible fine and jail sentence with an additional possibility of civil court action.

INDIAN HEALTH SERVICE
INJURY PREVENTION PROGRAM
SEVERE INJURY SURVEILLANCE DATA - PHASE II
MOTOR VEHICLE SUPPLEMENTAL DATA

Service Unit: ___	Community: ____	Chart No. __________

Severity: ___ A = Hospitalized B = Fatal C = Outpatient Visit

Age: ____	Sex: ___	Date of Visit: ___/___/___	Length of Stay: ____

Nature of Injury: ______________________ N-Code: _________

External Cause of Injury: ______________________ E-Code: _________

Describe Injury Event: ______________________________

THE INJURED PERSON WAS: [___]
A=DRIVER OF MOTOR VEHICLE
B=OCCUPANT OF MOTOR VEHICLE
C=PEDESTRIAN STRUCK BY MOTOR VEHICLE
D=BICYCLIST STRUCK BY MOTOR VEHICLE

WAS THIS INCIDENT: [___]

A=SINGLE VEHICLE INCIDENT
B=MULTIPLE VEHICLE INCIDENT
--/--/--
IF A MULTIPLE VEHICLE INCIDENT, DAMAGE TO INJURED PERSON'S VEHICLE WAS TO [___]
A=FRONT
B=SIDE
C=REAR
D=UNKNOWN

WAS PEDESTRIAN OR BICYCLIST: [___]
A=CROSSING AT INTERSECTION
B=CROSSING ELSEWHERE
C=WALKING/RIDING ALONG WITH TRAFFIC
D=WALKING/RIDING ALONG ROAD AGAINST TRAFFIC
E=VEHICLE CAME OFF ROAD
F=LAYING IN ROAD
G=IN PARKING LOT
H=OUTSIDE HOME (e.g. DRIVEWAY)
I=OTHER (____________________)

IF MULTIPLE VEHICLE INCIDENT, OTHER VEHICLE INVOLVED WAS: [___]
A=AUTOMOBILE
B=PICKUP TRUCK
C=TRUCK (1+ TON)
D=FARM VEHICLE (TRACTOR, ETC.)
E=MOTORCYCLE
F=ATV, 3 WHEELER
G=ATV, 4 WHEELER
H=SNOW MACHINE
I=BICYCLE
J=OTHER (______________)

INJURED PERSON WAS DRIVER/OCCUPANT OF: [___]
A=AUTOMOBILE
B=PICKUP TRUCK
C=TRUCK (1+ TON)
D=FARM VEHICLE (TRACTOR, ETC.)
E=MOTORCYCLE
F=ATV, 3 WHEELER
G=ATV, 4 WHEELER
H=SNOW MACHINE
I=OTHER (______________)

DID THE VEHICLE... ROLL OVER? [___]...HIT A FIXED OBJECT? [___]...HIT AN ANIMAL IN ROAD? [___] INJURED PERSON FELL/WAS THROWN FROM VEHICLE [___]

ENVIRONMENTAL CONDITIONS

LIGHTING: [___]
A=DAYLIGHT
B=DARK
C=DARK BUT LIGHTED
D=DAWN OR DUSK
E=UNKNOWN

SIGNALS: [___]
A=NONE
B=FLASHING WARNING
C=RED-YELLOW-GREEN
D=STOP SIGN
E=YIELD SIGN
F=OTHER __________

ROADWAY JURISDICTION: [___]
A=TRIBE
B=BIA
C=COUNTY
D=STATE
E=FEDERAL
F=CITY
G=PRIVATE
H=UNKNOWN

PROTECTION: [___]
A=SEAT BELT
B=CHILD RESTRAINT
C=CRASH HELMET
D=OTHER __________

ROAD CONDITIONS [___]
A=DRY
B=WET
C=SNOWY/ICY
D=OTHER __________

VISIBILITY: [___]
A=RAIN
B=FOG
C=SNOW/SLEET
D=CLEAR
E=OTHER (__________)

ROAD TYPE: [___]
A=UNPAVED
B=SINGLE LANE PAVED
C=TWO LANE, PAVED
D=DIVIDED HIGHWAY
E=OTHER (__________)

MODIFICATIONS THAT MIGHT PREVENT INJURY/REDUCE SEVERITY [__][__][__][__]
A=NO-PASS STRIPE
B=RUMBLE STRIPS
C=MEDIAN BARRIER
D=IMPROVED LIGHTING
E=REDUCE POSTED SPEED
F=USE OCCUPANT RESTRAINTS
G=SNOW REMOVAL
H=INSTALL GUARDRAILS
I=SAND ROADWAY
J=SEPARATE PEDES. & ROAD
K=ROADSIDE HAZARD REMOVAL
L=SIGNALIZED INTERSECTION
M=REFLECTORS ON CURVE
N=IMPROVE ROAD SKID RESTANCE
O=CROSS WALKS
P=INSTALL WARNING SIGNS
Q=REDUCE VEHICLE SPEED
R=KEEP ANIMALS OFF ROAD
S=STRIPE ROAD
T=USE CROSSING GUARDS
U=RESTRICT PASSENGERS FROM RIDING IN BACK OF PICKUP
V=OCCUPANT PROTECTION FOR BACK OF PICKUP
W=REMOVE ROAD-SIDE VEGETATION
X=OTHER __________

INDIAN HEALTH SERVICE
INJURY PREVENTION PROGRAM
SEVERE INJURY SURVEILLANCE DATA - PHASE II
FALL SUPPLEMENTAL DATA

Service Unit: ___	Community: ____	Chart No. __________

Severity: ___ A = Hospitalized B = Fatal C = Outpatient Visit

Age: _____	Sex: ___	Date of Visit: ___/___/___	Length of Stay: ____

Nature of Injury: ______________________	N-Code: _______
External Cause of Injury: ______________________	E-Code: _______

Describe Injury Event: ____

FALL TYPE: [___] A=SAME LEVEL B=DIFFERENT LEVEL

SAME LEVEL FALLS: [___]

{INSIDE}
A=BATHTUB
B=OTHER BATHROOM
C=OTHER HOME INSIDE
D=PUBLIC BUILDING
E=PRIVATE BUILDING
F=SCHOOL

{OUTSIDE}
G=OTHER HOME OUTSIDE
H=WALKING/HIKING
I=PLAYGROUND
J=SPORTS FIELD
K=SIDEWALK
L=STREET

M=OTHER (______________________)

DIFFERENT LEVEL FALLS: [___]
A=STAIRS INSIDE
B=STAIRS OUTSIDE
C=HOME YARD
D=BICYCLE
E=PLAYGROUND EQUIPMENT
F=WINDOW
G=ROOF
H=TREE
I=CLIFF OR OTHER DROPOFF
J=LADDER
K=FELL OFF HORSE
L=OTHER (______________________)

MODIFICATIONS THAT MIGHT HAVE PREVENTED INJURY OR REDUCED SEVERITY:
[___] [___] [___] [___]
A=NONSKID STRIPS
B=NONSKID RUG
C=NONSKID SHOES
D=INSTALL HANDRAILS/GRAB BARS
E=SNOW OR ICE REMOVAL
F=SOFT CARPET
G=STAIR REPAIRS
H=FENCE OR OTHER BARRIER
I=IMPROVE LIGHTING
J=SOFT MATERIAL UNDER PLAYGROUND EQUIPMENT
K=REMOVE SLIP/TRIP HAZARD
L=SPORTS SAFETY EQUIPMENT
M=OTHER (______________________)

INDIAN HEALTH SERVICE
INJURY PREVENTION PROGRAM
SEVERE INJURY SURVEILLANCE DATA - PHASE II
FIRE/BURN SUPPLEMENTAL DATA

Service Unit: ___ | Community: ____ | Chart No. ___________

Severity: ___ A = Hospitalized B = Fatal C = Outpatient Visit

Age: ____ | Sex: ___ | Date of Visit: ___/___/___ | Length of Stay: ____

Nature of Injury: ________________________ | N-Code: ________

External Cause of Injury: ________________________ | E-Code: ________

Describe Injury Event: ____

PLACE OF FIRE: [___] A = HOME B = CAR C = OUTDOORS D = OTHER

IF HOME (A), LOCATION OF VICTIM: [___]
A=BEDROOM C=BATHROOM E=OTHER
B=LIVINGROOM D=KITCHEN

NUMBER OF DOOR EXITS TO HOME ____

WAS VICTIM SLEEPING? _____

IGNITION OR HEAT ORIGIN: [___]
A=CIGARETTE
B=KITCHEN STOVE
C=WOODSTOVE/FIREPLACE
D=KEROSENE HEATER
E=OTHER HEATER
F=CHIMNEY
G=ELECTRICAL WIRING
H=OPEN PIT FIRE
I=OUTDOOR GRILL(GAS/CHARCOAL)
J=GASOLINE
K=PROPANE
L=HOME APPLIANCE
M=MATCHES/LIGHTER
N=WATER HEATER
O=FOOD OR DRINK
P=OTHER ________

MATERIAL FIRST IGNITED: [___]
A=CHAIR OR SOFA
B=BED
C=LOOSE PAPERS
D=CLOTHING
E=DRAPES
F=CARPET
G=COOKING GREASE
H=OTHER ________

WAS A SMOKE DETECTOR INSTALLED AND OPERATIONAL: [____]
IF YES, DID THE DETECTOR SOUND AN ALARM: [____]

WAS AN OPERATIONAL FIRE EXTINGUISHER AVAILABLE: [____]
IF YES, WAS THE EXTINGUISHER USED: [____]

MODIFICATIONS THAT MIGHT HAVE PREVENTED THE INJURY OR REDUCED THE SEVERITY: [___] [___] [___] [___]

A=ADDITIONAL EXIT
B=OPERATIONAL SMOKE DETECTOR
C=OPERATIONAL FIRE EXTINGUISHER
D=SLEEPING NEARER EXITS
E=SLEEPING WITH DOOR CLOSED
F=ESCAPE LADDERS (ROPE)
G=PROPERLY INSTALLED COOKING UNIT
H=PROPERLY INSTALLED/OPERATING GAS WATER HEATER
I=PROPERLY INSTALLED KEROSENE HEATER
J=PROPERLY INSTALLED WOOD STOVE
K=CLEANED CHIMNEY
L=REDUCED HOT WATER TEMPERATURE
M=LESS TIP-PRONE FOOD/DRINK CONTAINER
N=SUPERVISION
O=OTHER ____________________
____

INDIAN HEALTH SERVICE
INJURY PREVENTION PROGRAM
SEVERE INJURY SURVEILLANCE DATA - PHASE II
DROWNING/NEAR DROWNING SUPPLEMENTAL DATA

Service Unit: ___	Community: ____	Chart No. ________

Severity: ___ A = Hospitalized B = Fatal C = Outpatient Visit

Age: ____	Sex: ___	Date of Visit: ___/___/___	Length of Stay: ____

Nature of Injury: ________________	N-Code: ________
External Cause of Injury: ________________	E-Code: ________

Describe Injury Event: ________________________________

DID THE VICTIM KNOW HOW TO SWIM: [___]

WAS THE VICTIM ALONE: [___] IF NOT ALONE, HOW MANY OTHERS: [___]

WHAT WAS THE WATER TEMPERATURE AT THE TIME OF THE INCIDENT: [___]

BODY OF WATER INVOLVED: [___]

A=BATHTUB
B=SUPERVISED BEACH
C=UNSUPERVISED BEACH
D=RIVER
E=LAKE
F=OCEAN
G=DITCH
H=SWIMMING POOL
I=FLOOD
J=OTHER (SPECIFY:________________)

WATERCRAFT INVOLVED: [___]

A=NONE
B=MOTORBOAT
C=SAILBOAT
D=ROWBOAT
E=CANOE/KAYAK
F=MOTORIZED RAFT
G=NONMOTORIZED RAFT
H=OTHER (SPECIFY:________________)

PREVENTIVE GEAR AVAILABLE: [___] [___] [___]

A=LIFELINE
B=ANY PFD
C=UNSINKABLE BOAT
D=FENCED AREA
E=NONE
F=OTHER (SPECIFY:________________)

MODIFICATIONS THAT MIGHT HAVE PREVENTED THE INCIDENT OR REDUCED THE SEVERITY: [___] [___] [___] [___]

A=LIFELINE
B=FENCED OFF AREA
C=SUPERVISION
D=ANY PFD
E=UNSINKABLE BOAT
F=LIFEGUARD
G=CPR TRAINING
H=FLOOD WARNING & EVACUATION
I=OTHER (SPECIFY:________________)

INDIAN HEALTH SERVICE
INJURY PREVENTION PROGRAM
SEVERE INJURY SURVEILLANCE DATA - PHASE II
ASSAULT SUPPLEMENTAL DATA

Service Unit: ___	Community: ___	Chart No. ___

Severity: ___ A = Hospitalized B = Fatal C = Outpatient Visit

Age: ___	Sex: ___	Date of Visit: ___/___/___	Length of Stay: ___

Nature of Injury: ___	N-Code: ___
External Cause of Injury: ___	E-Code: ___

Describe Injury Event: ___

WHERE DID THE ASSAULT OCCUR: [___]

NUMBER OF ASSAILANTS: [___]

A=RESIDENCE
B=OUTDOORS
C=BAR
D=OTHER BUSINESS
E=ELSEWHERE (___)

ASSAILANT RELATION TO INJURED: [___]

A=SPOUSE
B=FATHER
C=MOTHER
D=SIBLING
E=OTHER RELATIVE
F=ACQUAINTANCE
G=STRANGER
H=UNKNOWN

WEAPON USED IN ASSAULT: [___]

A=BODY (FISTS,ETC.)
B=GUN
C=KNIFE
D=OTHER SHARP OBJECT
E=BLUNT OBJECT
F=FIRE OR HEAT
G=POISON
H=VEHICLE
I=AX
J=OTHER (___)

APPARENT REASON FOR THE ASSAULT: [___]

A=RAGE
B=RAPE
C=ROBBERY
D=JEALOUSY
E=DIAGNOSED MENTAL ILLNESS
F=OTHER (___)

MODIFICATIONS THAT MIGHT HAVE PREVENTED THE INJURY OR REDUCED THE SEVERITY: [___] [___] [___] [___]

A=LIMIT QUANTITY OF ALCOHOL PURCHASABLE IN BARS OR AT LIQUOR STORE
B=METAL DETECTOR AT DOOR OR BAR; REFUSE SERVICE TO THOSE ARMED
C=SHATTER-PROOF CONTAINERS
D=PROVIDE LIGHTING IN HIGH RISK AREAS
E=POLICE PATROL OF HIGH RISK AREAS
F=ENHANCE PROTECTIVE CUSTODY
G=TOUGHER FINES/JAIL SENTENCES
H=OTHER (___)

INDIAN HEALTH SERVICE
INJURY PREVENTION PROGRAM
SEVERE INJURY SURVEILLANCE DATA - PHASE II
SUICIDE SUPPLEMENTAL DATA

Service Unit: ___	Community: ____	Chart No. ________

Severity: ___ A = Hospitalized B = Fatal C = Outpatient Visit

Age: ____	Sex: ___	Date of Visit: ___/___/___	Length of Stay: ____

Nature of Injury: ________________	N-Code: ________
External Cause of Injury: ________________	E-Code: ________

Describe Injury
Event: ______________________________

WHERE DID THE ATTEMPT OCCUR: [___]
A=RESIDENCE
B=JAIL
C=PUBLIC BUILDING OR BUSINESS
D=OUTDOORS
E=OTHER (____________________)

WEAPON USED IN SUICIDE: [___]
A=GUN
B=KNIFE
C=OTHER SHARP INSTRUMENT
D=CARBON MONOXIDE
E=PRESCRIPTION DRUG
F=OTHER DRUG
G=POISON
H=ROPE
I=JUMP
J=OTHER (____________________)

CIRCUMSTANCES: [___]
A=PHYSICAL ILLNESS
B=DIAGNOSED MENTAL ILLNESS
C=MIMICKING OF REAL/TV/FICTIONAL EVENT
D=FINANCIAL LOSS
E=SOCIAL/EMOTIONAL REJECTION
F=UNWANTED PREGNANCY
G=OTHER (____________________)

SOCIAL CONTEXT: [___]
A=ISOLATION
B=IN COMPANY OF OTHERS
C=UNKNOWN

NUMBER OF PREVIOUS ATTEMPTS: [___] (ENTER 9 IF UNKNOWN)

MODIFICATIONS THAT MIGHT HAVE PREVENTED INJURY OR REDUCED THE SEVERITY:
[___] [___] [___] [___]

A=ENCOURAGE SEEKING TREATMENT FOR DISTRESS/EMOTIONAL PROBLEMS
B=INCREASE AWARENESS TO FAMILIES OF DISTRESS SYMPTOMS AND OF SOURCES OF HELP
C=ENCOURAGE FAMILIES WITH EMOTIONALLY DISTURBED MEMBERS TO SEEK HELP, LIMIT ACCESS TO WEAPONS, DRUGS, ETC.
D=ENCOURAGE FAMILIES NOT TO LEAVE INDIVIDUALS ALONE IN CIRCUMSTANCES OR AREAS WHERE PREVIOUS SUICIDE ATTEMPTS OCCURRED.
E=SUICIDE HOTLINE/NETWORKING
F=INCREASE SURVEILLANCE OF INCARCERATED PERSONS
G=OTHER ______________________________

INDIAN HEALTH SERVICE
INJURY PREVENTION PROGRAM
SEVERE INJURY SURVEILLANCE DATA - PHASE II
OTHER SEVERE SUPPLEMENTAL DATA

Service Unit: ___		Community: ____	Chart No. __________
Severity: ___ A = Hospitalized B = Fatal C = Outpatient Visit			
Age: ____	Sex: ___	Date of Visit: ___/___/___	Length of Stay: ____
Nature of Injury: ______________________________			N-Code: ________
External Cause of Injury: ______________________			E-Code: ________
Describe Injury Event: ____			

TYPE OF ENERGY THAT CAUSED THE DAMAGE TO THE PERSON: [___]
A=MECHANICAL C=CHEMICAL
B=HEAT OR LACK OF HEAT D=ELECTRICAL

WHAT CONVEYED THE ENERGY TO THE PERSON (BE SPECIFIC, e.g., IF FARM TRACTOR GIVE MAKE, MODEL, PART THAT CAUSED INJURY) AND WHAT STRATEGIES COULD BE EMPLOYED TO REDUCE THE INCIDENCE OR SEVERITY OF THIS TYPE OF INJURY.

Appendix 6

DEFINITIONS

agents of injury - one or more various forms of energy that are imparted to a host (person) who is injured; mechanical energy (i.e. transportation crashes), heat energy (i.e. burns), lack of oxidation (i.e. drownings), chemical (i.e. chemical poisonings), electrical (i.e. electrocutions), and ionizing radiation (i.e. radiation poisonings)

case - an occurrence of injury

E Code - three to five digit numbers, developed as part of the International Classification of Diseases (ICD) codes, which specifically describe an injury event

fatal - a disease or injury resulting in death

injury - damage to the body caused by exchanges with environmental energy that are beyond the body's resilience

intervention - an environmental or educational action designed to reduce the occurrence and severity of human injury

morbidity - a measure of non-fatal disease or injury

mortality - a measure of fatal disease or injury

non-fatal - a disease or injury not resulting in death

prospective study - the investigation of disease or injuries that will occur in the future

rate - a measure of a part with respect to a whole (i.e. 100 motor vehicle crash deaths occurring to a population of 100,000 people yields a motor vehicle mortality rate of 100/100,000)

retrospective study - the investigation of disease or injuries that have already occurred

severe injury - fatalities, hospitalizations, losses of consciousness, and ambulatory fractures

surveillance - the close observation of injury events to identify specific agents of injury occurrence and changes in injury rates

Whiteriver Service Unit (WRSU)
Severe Injury Surveillance System (SISS) Protocol

Introduction

The WRSU SISS is a hospital based data system designed to collect and allow for analysis of epidemiological information of severe injuries occurring on or near the Fort Apache Indian Reservation. This active surveillance system is maintained by the staff of the WRSU Office of Environmental Health and Engineering (OEHE), Division of Environmental Health Services (DEHS).

Case Definition

Only **severe injuries** are entered into this data system. For the purpose of the SISS, a **severe injury** is defined as:

An injury resulting in 1 day of hospitalization(1) or fatality **and** able to be coded within the external cause (E-code) code range E800-E999.9 of the most recent version of the International Classification of Diseases (ICD) Code Book.

Note (1): Inpatient care at a mental health facility for substance abuse treatment may also be considered a hospitalization. Such a hospitalization, however, will only be considered a severe injury case if it can also be coded within the E-code range E800-E999.

For example, hospitalization for suicide ideation ("I want to kill myself") in which no physical injury resulted would not meet the definition of a severe injury. BUT, hospitalization for a suicide attempt (slashed wrist: E956) in which physical injury resulted (regardless of the degree of injury) would meet the definition of a severe injury.

Injury Classification or Types

The SISS contains etiologic data for seven injury types that are classified by E-code. For each injury the primary E-code assigned by hospital personnel and entered into the medical record is included in the SISS. In the absence of an E-code in the medical record, DEHS staff review the medical record and assign an E-code based on the narrative description of the injury. These seven types of injury are:

Injury Type	E-code Range
Assault	E960-E969.9
Drowning	E910-E910.9
Fall	E880-E888.9
Fire	E890-E899.9
Motor Vehicle Crash	E810-E829.9
Suicide	E950-E959.9
Other	All other injuries E800-E999.9 not elsewhere assigned an injury type.

Case Identification

For the majority of cases, the hospital emergency room (ER) log is routinely screened to identify potential severe injuries. Date of Visit, Medical Chart Number, Patient Name, and other related information about potential cases are collected from the ER log at both the Whiteriver Hospital and the Cibecue Clinic. Patients treated at Cibecue sometimes do not get sent to the Whiteriver hospital, so to ensure these cases are not missed, the Cibecue ER log must be checked for severe injury cases in addition to the ER log at the Whiteriver Hospital. The medical record for each case is then reviewed to determine if the case definition is met.

The Whiteriver Hospital Death Registry is referred to identify fatal cases not captured on the Whiteriver Hospital and/or Cibecue ER log.

The Whiteriver and Cibecue EMS log and WRSU Contract Health Log are also routinely consulted to identify potential severe injury cases.

Case Investigation

Once the case definition is met, a case investigation is conducted. The investigation involves the collection of primary and supplemental data related to the severe injury.

Primary data refers to those factors collected for and common to all severe injuries. Primary data include variables related to demographics, time, severity, cost, nature of injury, cause of injury, alcohol and drug involvement, and utilization of contract health care facilities. The major source for primary data is the hospital medical record. Medical record documents or forms that typically provide information related to injuries and primary data include the clinical record brief, ambulatory care record brief, emergency visit record, EMS run sheet, and discharge summary.

Supplemental data refers to etiologic factors specific to an individual type of severe injury (assault, drown, fall, fire, motor vehicle crash, other, or suicide). The medical record is also a useful source of supplemental data; however, other resources must often be utilized to collect supplemental data, such as police, contract health, and EMS records.

Data Collection Forms

Primary and supplemental data are collected and transcribed onto data collection forms. Once the cause of injury is determined and recorded on the primary data form, the corresponding supplemental data collection form is attached. See Section II of the SISS reference manual for a current copy of the primary and supplemental data collection forms.

Tracking Case Investigations

From the point of case identification to data entry, a case investigation may take several months to complete. Section I of the SISS reference manual contains a SISS Log. The SISS Log serves as a tracking tool to monitor the status of individual case investigations. The status of each case investigation, categorized by injury type, is entered on the log.

Data Entry

The software program Epi Info (version 6) serves as the electronic database for the SISS. Data collected are routinely entered into this database, which is maintained on one or more DEHS office computers. A backup of the current SISS database for each injury type, located in Section VII of the SISS reference manual, is maintained on the floppy disks labeled "WRSU SISS Working Copy."

Data Analysis and Reporting

Data are analyzed and reported to interested parties at least annually. A disk containing program files to assist with analysis is located in Section VI of the SISS reference manual. Instructions for use and hard copies of program files are located in Section VII. Any data reports generated from SISS data will be filed within Section VIII for future reference.

Confidentiality

At all stages of surveillance, all provisions of the Privacy Act are followed. When uncertain of Privacy Act compliance, the hospital medical records staff or others with knowledge of the Privacy Act are immediately consulted.

Limitations

It is recognized that the WRSU SISS has some limitations, including:

- The exclusion of ambulatory only cases;
- Conservative cost estimates which are only limited to the initial direct medical care;
- Missing fatal cases not triaged through the Whiteriver IHS Hospital or the Cibecue clinic;
- Inability to capture cases in which treatment is sought at a non-IHS facility and payment is not made by IHS (doesn't involve contract health services)

Clarifications

1. Estimated Cost of Severe Injuries

Estimated costs of initial medical care are calculated using the following method:

$117	initial ER treatment
$585	per day of inpatient hospitalization (IHS or Contract)
$0	ground ambulance transport to Whiteriver IHS Hospital
$360	ground transport to contract health facility
$2,825	Native American Air Ambulance transport to contract facility
$4500-5400	Air Evac and/or Air Eagle air transport to contract facility

Explanation of cost calculation:
ER and Hospitalization costs are national estimates of treatment costs in federal health care facilities.

Ground transport is provided by Whiteriver EMS under contract 638 and does not bill Whiteriver IHS hospital; however, ground transport to contract facility is approximately

$6.30 per mile. Per conversation with the EMS Director (name; date), the average roundtrip transport is XXX miles – resulting in an average estimated cost of $XXXX.

Native American Air Ambulance is contracted by Whiteriver IHS Hospital. Per conversation with ___________ (name; date), the air transport to a contract facility is $XXX per mile. The average roundtrip is XXX miles – resulting in an average estimated cost of $XXXX.

Air Evac and Air Eagle are not contracted by the Whiteriver IHS Hospital. Per conversation with ___________ (name; date), the air transport by non-contract carriers to a contract facility is $XXX per mile. The average roundtrip is XXX miles – resulting in an average estimated cost of $XXXX.

2. Age
For injury victims < 1 year of age, age = 0.
For injury victims > 99 years of age, age = 99.

3. Unknown or Unspecified Cause of Injury
For injury cases in which the cause of injury is unknown or unspecified, use the "Other Injuries" supplemental data collection form.

4. Fall from Motor Vehicle Injuries
If a person falls from a moving motor vehicle, use MVC E-code E818.
If a person falls from a stationary motor vehicle or if it is unknown or unspecified whether or not the vehicle was moving, use the Fall E-code E884.9.

5. Single Vehicle and Multiple Vehicle Crashes
Per the ICD9, E800-E848 are classified as transport accidents (see ICD9 definition). Per the WRSU SISS Protocol, the E-codes E810-E829.9 encompass Motor Vehicle Crashes.

Single vehicle crashes obviously are those crashes involving only one vehicle and multiple vehicle crashes are those involving more than one vehicle. Our determination of whether or not a crash is a single or multiple vehicle crash hinges on our definition of a vehicle.

For the purpose of the SISS, a vehicle is defined as any motorized or non-motorized device or animal used to transport people or property.

Excludes: pedestrian or pedestrian conveyance (see ICD9 definition)
animal not being ridden
parked vehicle
elevator

Transf but no Admit
Clarification:

example CT scan @ Alamogordo but no Admit = no case

Examples of single and multiple vehicle crashes:

Automobile v.:

	Single	Multiple	E-code
tree, fence, other fixed object	☑	☐	815.X;816.X
automobile	☐	☑	811.X
ridden bicycle	☐	☑	813.X
pedestrian:	☑	☐	814.X
livestock/wild animal (not being ridden)	☑	☐	815.X
skateboarder/rollerblader/rollerskater	☑	☐	814.X
train	☐	☑	810.X
ATV (3 or 4-wheeler)	☐	☑	813.X
motorcycle	☐	☑	813.X
animal drawn vehicle	☐	☑	813.X
ridden animal	☐	☑	813.X
parked vehicle	☑	☐	812.X
fall off bicycle:	☑	☐	826.6
fall off animal being ridden	☑	☐	828.5

SEVERE INJURY SURVEILLANCE SYSTEM LOG
WRSU SISS

Because a case investigation may take several months to complete, this SISS Log is used as a tracking tool to monitor the status of individual investigations, categorized by injury type. The SISS Log contains information related to the following variables:

Date: Date of the injury. Initially, this is the date of injury as indicated on the ER log.

Name: Name of the injury victim. While not a variable included in the SISS database, the victim's name is needed when collecting data from other sources (i.e., police records, contract health records, death certificates, etc.)

Chart#: The hospital medical record number of the patient.

Status of Investigation: The status of the investigation. When indicated "COMPLETE", all necessary and available data sources have been reviewed. For incomplete investigations, the data variables and/or data sources requiring further investigation are listed in this column. Additional comments can be inserted in this column. For example, a note indicating the medical record did not indicate a LOS.

Epi Info Data Input: A check mark "✓" in this column indicates all data for this case has been entered into Epi Info.

_______________ Injury Type

SEVERE INJURY SURVEILLANCE LOG
WRSU SISS

Date	Name	Chart#	Status of Investigation	Epi Info Data Input

(20 cases per page)
Rev. 12/2000

DATA ENTRY GUIDE
WRSU SISS – CODES

DAY OF WEEK

Sunday	1
Monday	2
Tuesday	3
Wednesday	4
Thursday	5
Friday	6
Saturday	7

TRANSFER FACILITIES

Good Samaritan	GOOD SAM
Navapache	NRMC
Phx. Ind. Med. Center	PIMC
Phx. Children's Hosp.	PHXCHILD
Maricopa Community	MCMC
University Med. Ctr.	UMC
St. Joeseph's	ST.JOE
Other	OTHER

COMMUNITY CODES (listing in alphabetic order)

Alchesay Flats	975A	Lifesavers	992E
Another World	992A	Lonesome Dove	096A
Bengay	992B	Lower East Fork	965B
Canyon Day	043A	McNary	905B
Carrizo	963A	Medicine City	995D
Cedar Creek	044A	North Fork	975C
Cemetery	994A	N.WR/Nobody Home	993A
Cibecue	964A	Old Fairgrounds	991B
China Town	992C	One Step Beyond	992F
Cradle Board	975B	Over the Rainbow	995E
Corn on the Cob	965A	Rainbow City	995F
Dark Shadows	992D	Six Pack	043B
Diamond Creek	996A	Smurf Village	992G
FATCO	991A	Sunrise	093A
Fort Apache	967A	Turkey Creek	097A
Forest Dale	996B	Upper East Fork	965C
Hondah	905A	Whiskey Flats	994B
IHS Govt. Housing	995A	Whiteriver	990A
Jurassic Park	995B	Yucca Flats	994C
Knots Landing	995C	Other	000

966A -EAST FORK

Rev. 12/2000

COMMUNITY CODES (listing by community code)

000
A. Other

043
A. Canyon Day
B. Six Pack

044
A. Cedar Creek

093
A. Sunrise

096
A. Lonesome Dove

097
A. Turkey Creek

905
A. Hondah
B. McNary

963
A. Carrizo

964
A. Cibecue

965
A. Corn on the Cob
B. Lower East Fork
C. Upper East Fork

967
A. Fort Apache

975
A. Alchesay Flats
B. Cradle Board
C. North Fork

990
A. Whiteriver

991
A. FATCO
B. Old Fairgrounds

992
A. Another World
B. Bengay
C. China Town
D. Dark Shadows
E. Lifesavers
F. One Step Beyond
G. Smurf Village

993
A. N.Whiteriver/Nobody Home

994
A. Cemetery
B. Whiskey Flats
C. Yucca Flats

995
A. IHS Govt. Housing
B. Jurassic Park
C. Knots Landing
D. Medicine City
E. Over the Rainbow
F. Rainbow City

996
A. Diamond Creek
B. Forest Dale

965D
D. East Fork Unsp.

969A
Seven Mile (NOS)

966A - East Fork

SEVERE INJURY SURVEILLANCE SYSTEM
SUMMARY REPORT
[redacted] SERVICE UNIT, 2001 - 2005

INTRODUCTION

Injuries are known to have a serious impact on the health and well-being of many Native Americans. Each year in the United States, more than 2,000 Native Americans lose their lives to injuries and nearly 9,000 are injured severely enough to be hospitalized. [1, 2]

Due to the high prevalence of injury-related hospitalizations and fatalities among Native Americans, Indian Health Service (IHS) has made injury prevention a top priority to address this important public health problem. The program is based on a public health approach model which focuses on injury problem identification, risk identification, intervention, development / implementation, and evaluation. On the [redacted] Reservation in [redacted], the [redacted] Service Unit Office of Environmental Health and Engineering, Division of Environmental Health Services (DEHS) conducts injury prevention activities in support of the program. These injury prevention activities can be characterized as public health assessments, special projects, coalitions / collaborations, and training.

SEVERE INJURY SURVEILLANCE SYSTEM

In order to prevent injuries from occurring, it is necessary to be able to identify specific causes and factors contributing to them. To gather such information, the [redacted]SU DEHS established a Severe Injury Surveillance System (SISS).

A severe injury is defined as an injury which results in a patient's hospitalization or fatality, and can be coded within the External Cause of Injury (E-Code) range E800 - E999.9 of the International Classification of Revision 9, Clinical Modification (ICD-9-CM). The [redacted]SU Indian Hospital emergency room log is screened to identify potential severe injury cases. When an injury occurs, the patient presents to the [redacted]SU Indian Hospital emergency room and is entered into the emergency room log. This log is reviewed by Environmental Health Officers within the [redacted]SU DEHS and a list of severe injury cases is collected. For this report, the data collection only involved the review of the patient's medical record to determine basic demographic and etiologic factors of the injury. Supplemental data collection (i.e. hospital Discharge Planning, police reports, etc) was not utilized. Surveillance forms are completed based upon the injury type. Data are entered into the Epi-Info database according to injury type to be analyzed for trends.

This report summarizes SISS data collection for the [redacted]SU during the five-year period beginning on January 1, 2001 through December 31, 2005. Injuries were classified by one of seven types: assault, drowning, fall, fire / burn, motor vehicle crash (MVC), other, and suicide / self-inflicted. The “other” injury type refers to injuries which could not be classified into the other previous types.

Severe injuries occurring on or near the [redacted], but not treated by the [redacted]SU Indian Hospital, may not have been identified by the SISS and may not be included in this report.

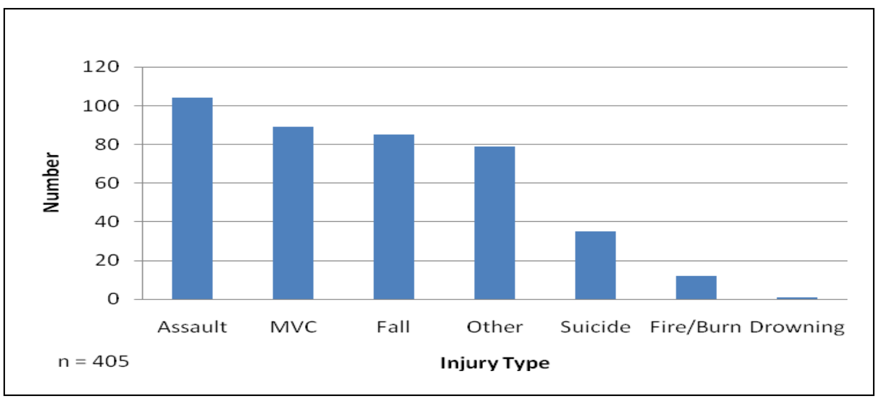
GENERAL CHARACTISTICS

Injury Summary

There were 601 injuries reported as a hospitalization or a fatality. Some of the hospitalization lengths of stay were unreported or unknown, therefore these injuries were not included in the data analysis. A total of 405 injuries met the severe injury case definition.

As illustrated in Figure 1, assault injuries (104; 25.7%) were the leading type of severe injury, followed by MVC injuries (89; 22%), fall injuries (85; 21%), “other” injuries (79; 19.5%), suicide / self-inflicted injuries (35; 8.6%), fire / burn injuries (12; 2.9%), and drowning (1; 0.3%).

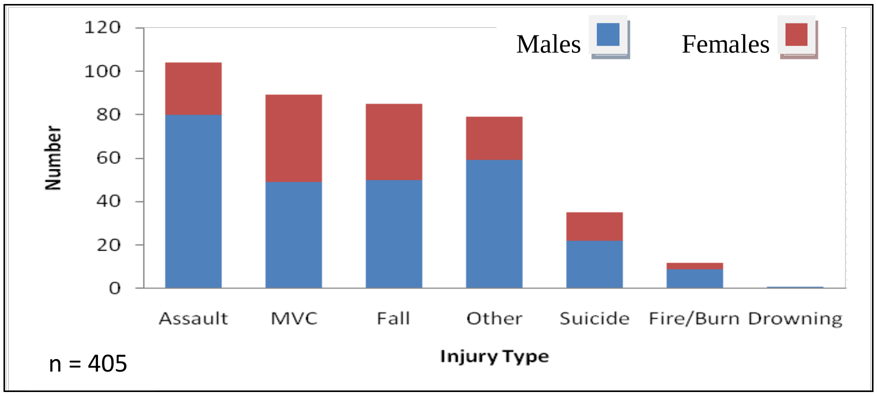
Figure 1. Types of Severe Injuries, [redacted] Service Unit, 2001 – 2005.



Gender

A greater number of males sustained severe injuries (270; 66.7%) than females (136; 33.6%). For the males, assaults, "other," and falls were the leading types of injuries. For the females, MVC, falls, and assaults were the leading types of injuries. Of all the injury types, no category had more cases of females than males.

Figure 2. Distribution of Injury Type by Gender, [redacted] Service Unit, 2001 – 2005.



Age

The age of the person injured was known for 402 of the 405 severe injury cases (99.3%). Three ages could not be determined because one record had an unknown date of visit, and two records had Bureau of Indian Affairs (BIA) fatality report numbers with an undocumented date of birth or age. The documented ages ranged from less than one year to 90 years old. Of these, the average age was 39.5 years. The three injury types missing one record each were assaults, MVC, and falls.

Figures 3, 4, and 5 illustrate the distribution by injury type for each age group. Children (0 - 17 years), adults (18 - 65 years), and elderly (66+ years).

MVCs were the leading type of severe injury for children, assaults were the leading type of severe injury for adults, and falls were the leading type of severe injury for the elderly.

Figure 3. Distribution of Injury Type for Children (0 - 17 years), [redacted] Service Unit, 2001 – 2005.

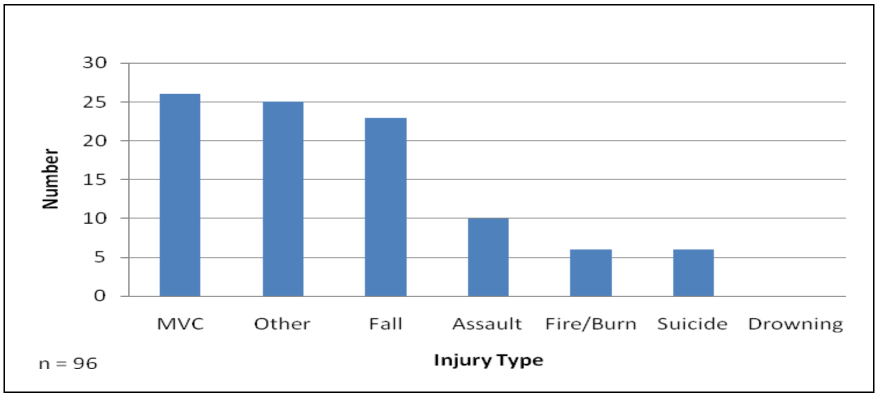


Figure 4. Distribution of Injury Type for Adults (18 - 65 years), [redacted] Service Unit, 2001 – 2005.

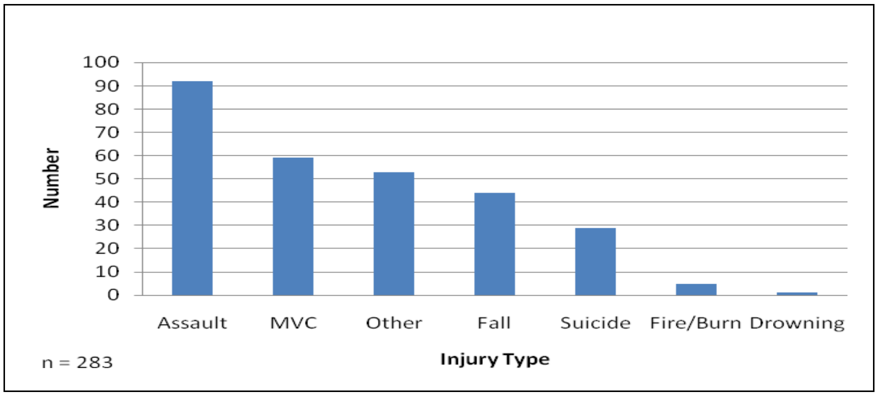
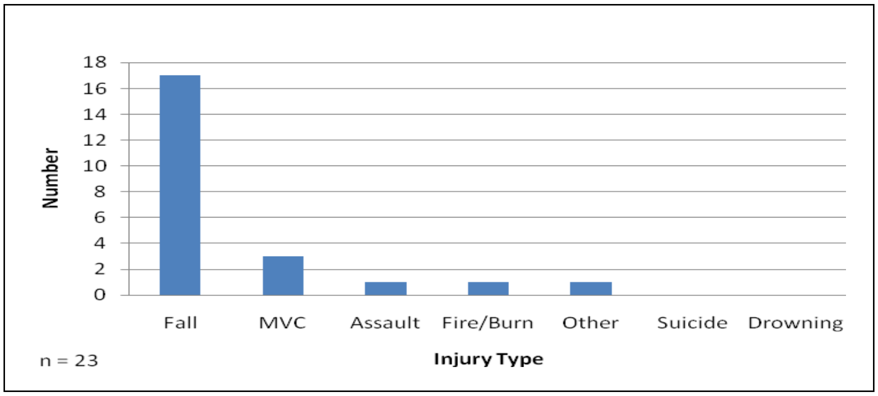


Figure 5. Distribution of Injury Type for Elderly (66+ years), [redacted] Service Unit, 2001 – 2005.

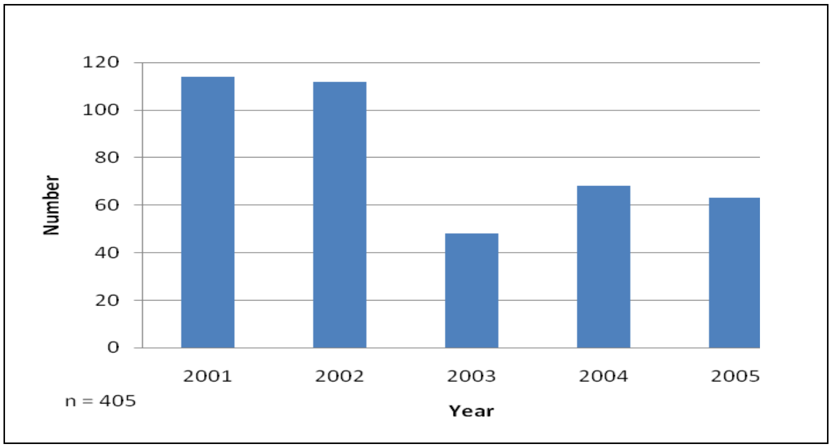


Year

For the report period, there was an average of 81 severe injuries per year. The most severe injuries cases (114) occurred in 2001; the fewest severe injuries cases (48) occurred in 2003.

As illustrated in Figure 6, there was a dramatic decrease (44.7%) in severe injuries during the report period.

Figure 6. Distribution of Injuries by Year, [redacted] Service Unit, 2001 – 2005.



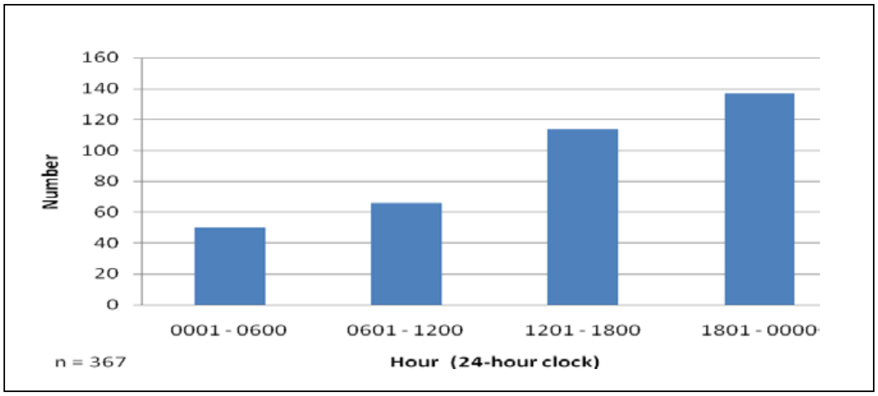
Month

For the report period, there was an average of 33.8 severe injuries per month. The fewest severe injury cases (18) occurred in September; the majority of severe injury cases (50) occurred in May. There was no apparent trend in the distribution of injuries by month of occurrence.

Time (24-hour clock)

The time of day in which the injury occurred was available for 367 of the 405 severe injury cases (90.6%). The 24-hour time period was divided into four groups of six hours each (0001 - 0600 hours; 0601 - 1200 hours; 1201 - 1800 hours; and 1801 - 0000 hours). As illustrated in Figure 7, most severe injuries occurred during the 1801 - 0000 hours (137) and during the 1201 - 1800 hours (114) time periods.

Figure 7. Distribution of Injury by Time of Day, [redacted] Service Unit, 2001 – 2005.



<u>Severity</u>

Of the 405 severe injury cases, 346 (85.4%) resulted in a hospitalization and 59 (14.6%) resulted in a fatality.

Injury Hospitalizations

Most of the severe injuries resulted in hospitalization, therefore it is not surprising that the distribution of injury hospitalizations by injury type, gender, and age is similar to the distribution of these variables for all severe injuries. Length of stay (LOS) refers to the number of days a person is admitted to the hospital and is an estimate of the relative severity of injuries resulting in hospitalizations.

As mentioned previously, 601 injuries were reported as a hospitalization or a fatality. Some of the hospitalization LOS was unreported or unknown, therefore these were not included in the data analysis. Of the 405 injuries classified as severe injury cases, LOS was reported for all hospitalizations.

Of the 405 severe injury cases, the average (mean) LOS was 13.9 days and the median LOS was 17 days. The total LOS for all injury hospitalizations was 1,273 days and the range was 1 - 36 days. Table 1 shows the relative severity for known LOS cases.

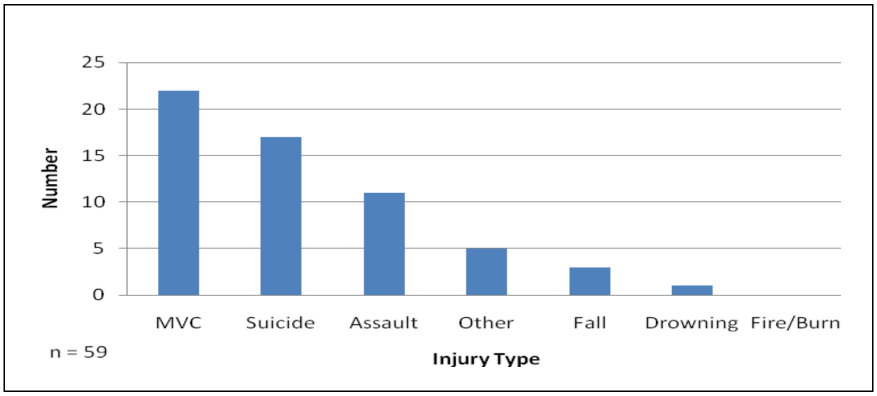
Table 1. Relative Severity by LOS for Injury Hospitalizations, [redacted] Service Unit, 2001 – 2005.

Injury Type	Mean LOS	Median LOS	Total LOS	LOS Range
Assault (n = 104)	23.2	21	301	1 - 36
MVC (n = 89)	20.4	21	286	1 - 30
Fall (n = 85)	22.1	20.5	376	1 - 27
Other (n = 79)	17.8	17	214	1 - 20
Suicide (n = 35)	6.8	7	41	1 - 6
Fire / Burn (n = 12)	6.9	6	55	1 - 15
Drowning (n = 1)	0	0	0	0
All Types (n = 405)	13.9	17	1,273	1 - 36

Injury Fatalities

The distribution of gender and age of the injury fatalities was similar to the gender and age distribution of all severe injuries. With only 59 cases, the distribution of fatalities by injury type did have some variation when compared to all severe injuries. As illustrated in Figure 8, most fatal injuries involved MVCs (22; 37.3%) followed by suicides (17; 28.8%), assaults (11; 18.6%), "other" injuries (5; 8.5%), falls (3; 5.1%), drowning (1; 1.7%), and fire / burns (0). The age of the fatality was unknown for one case each of assaults, MVC, and fall injury types.

Figure 8. Distribution of Injury Fatalities, [redacted] Service Unit, 2001 – 2005.



Figures 9 – 12 illustrate the distribution of injury fatalities by gender and age groups.

Figure 9. Distribution of Injury Fatalities by Gender, [redacted] Service Unit, 2001 – 2005.

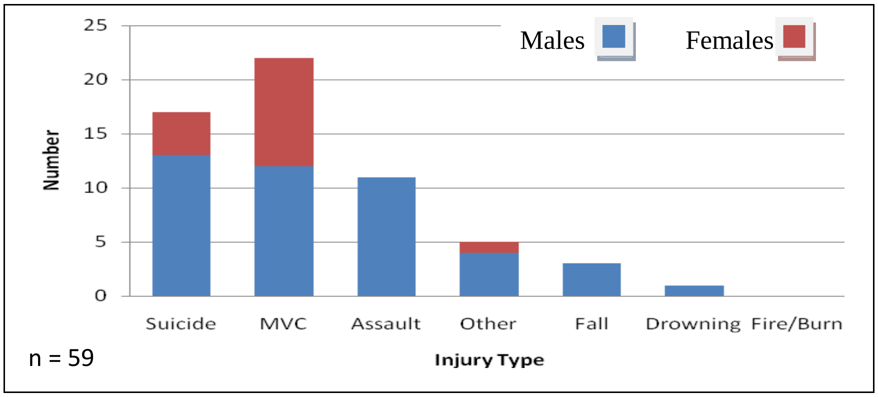


Figure 10. Distribution of Injury Fatalities for Children (0 - 17 years), [redacted] Service Unit, 2001 – 2005.

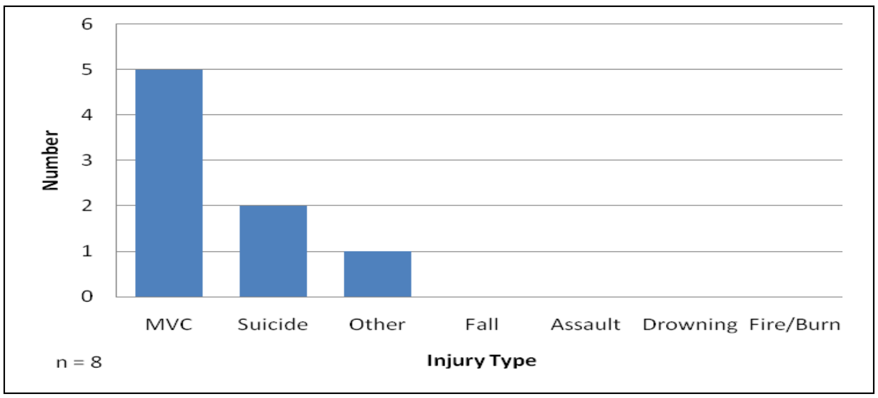


Figure 11. Distribution of Injury Fatalities for Adults (18 - 65 years), [redacted] Service Unit, 2001 – 2005.

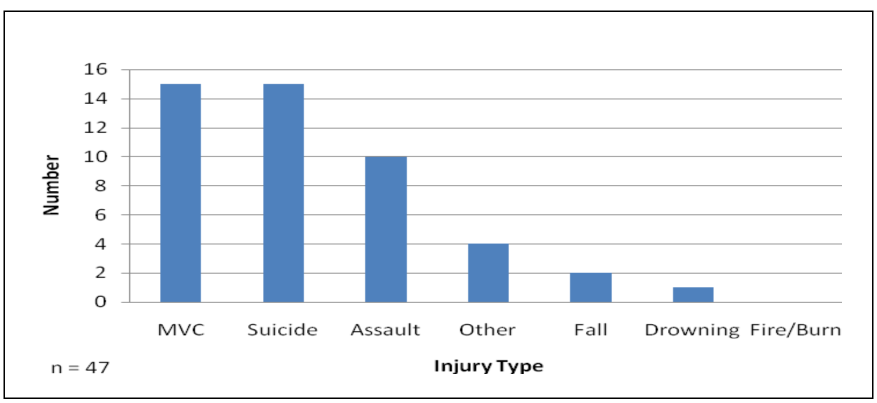
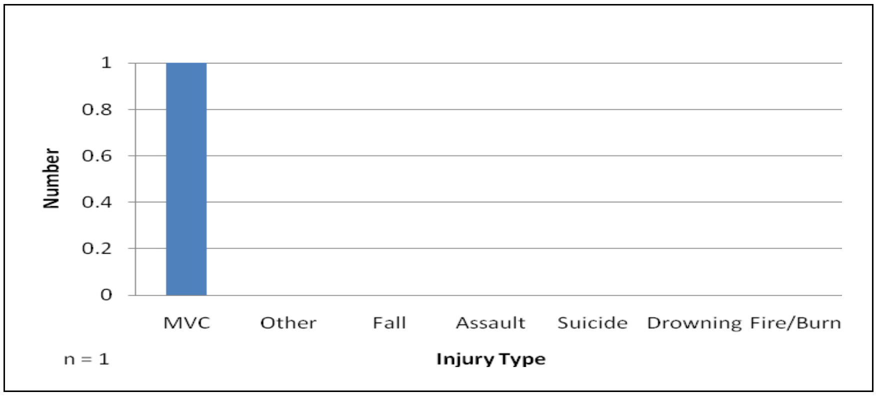


Figure 12. Distribution of Injury Fatalities for Elderly (66+ years), [redacted] Service Unit, 2001 – 2005.



Alcohol

Of the 405 severe injury cases, alcohol was involved in 229 cases (56.5%) and was not involved in 138 cases (34.1%). Unfortunately, it is not the routine policy of the hospital, police department, or others responding to and treating severe injury cases to collect quantitative alcohol results, such as blood alcohol content. Instead, the determination of alcohol involvement for injury cases is a subjective assessment made by medical providers or others in which alcohol involvement was indicated as present or absent. The assessment was typically made by observing the presence of alcohol at the scene of the incident, the smell of alcohol on the breath of the injured person, or the injured person's admittance of alcohol use. Such a qualitative response does not indicate impairment of an individual involved in an injury, therefore, providing limited value of the alcohol data.

Cost

Comprehensive data on the cost of injuries to Native Americans was not available for 2001 - 2005. Most studies were focused on a specific injury category, a specific age group, or cause, such as alcohol-related injuries. There was also no general and accessible source of cost information available for injuries to Native Americans.

Burden of Injuries to Native Americans

Even though precise estimates of total costs accrued to Native Americans from injuries was difficult, the impact was obvious and the costs were enormous. Accident and injury rates for Native American populations were substantially greater (at least two to five times greater) than those for the general United States population.

Estimating the Cost of Injury

Cost estimates were derived from limited resources available for health care delivery to Native Americans. The Federal Employee Health Benefit (FEHBP) Disparity Index developed under the support of the IHS and Tribal health authorities estimated that IHS funding for Native American health care in 2001 was only 52% of the per capita expenditures under the Federal Employees Health Benefit Program ($1,384 per Native American users versus $2,687 per FEHBP users).[3]

IHS collects injury cost data only for contract care services. This significantly underestimates the exact cost of care. Both utilization and cost data were incomplete. Many contract care facilities and providers do not capture and report injury data through the use of the External Cause of Injury (E-Code).

Table 2 illustrates the IHS Contract Health Services expenses for injuries and poisonings for 1994 – 1997, including the average annual cost, cost per inpatient care, outpatient costs, and estimated costs for 2001 and 2002. The 2001 and 2002 estimates were made by applying the Medical Care Component of the Consumer Price Index Price changes from 1997 – 2002 to the IHS cost estimates for 1994 – 1997.[4] IHS reported 17% of all contract care expenses for inpatient care and 16% for outpatient care were for care of injuries and poisonings over this period. Even if substantially understated, these statistics illustrate the very large burden injuries place on scarce health care resources. The average annual Contract Health Service expenditure for care of injuries and poisonings for 1994 – 1997 was $42,608,515.[5]

Table 2. IHS Contract Health Services Average Annual Expenses, Injuries, and Poisonings, 1994 – 1997 and Estimated 2001 and 2002.

Category	Average Annual Expense	Average Annual Expense per Case
Inpatient (1994 – 1997)	$32,243,508	$11,305
Outpatient (1994 – 1997)	10,365,007	570
Total (1994 – 1997)	42,608,515	
Inpatient (2001)	38,885,671	13,634
Outpatient (2001)	12,500,198	687
Total (2001)	51,385,869	
Inpatient (2002)	41,063,269	14,378
Outpatient (2002)	13,200,209	752
Total (2002)	54,263,478	

Table 3 illustrates the estimated total direct medical care costs of hospitalizations and ambulatory care provided by IHS, Tribal and contract care facilities, and providers in 2001. These are the cost per case figures reported for Contract Health Services from 1994 – 1997 adjusted for changes in the Medical Expense Component of the Consumer Price Index to reflect the 2001 price level. They also reflect lower hospital utilization rates for Native Americans relative to the general population and relatively greater emphasis and resultant ambulatory care use.[5]

Table 3. Estimated Total Native American Injury-Related Hospital Inpatient and Ambulatory Care Costs, 2001.

Category	Discharges / Visits	Total Cost	Cost per Case
Inpatient	7,358 discharges	$102,033,386	$13,867
Ambulatory	353,398 visits	$247,025,202	$699

SUPPLEMENTAL DATA

The most frequent types of severe injuries were sustained from assaults (104), MVC (89) and falls (85). These three injury types represented 69% of all severe injuries. For that reason, these injury types will be further examined.

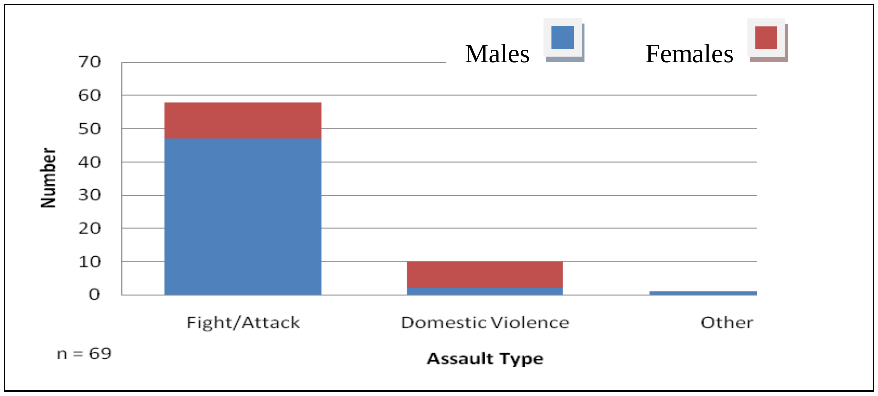
Assault Injuries

As previously mentioned, assault injuries were the leading type of severe injury at the [redacted]SU during the report period. There were 104 assault injury cases, of which 11 were fatal.

The gender was documented for all of the assault injury cases, and the age was documented for 103 cases (99%). A greater number of males sustained assault injuries (80; 76.9%) than females (24; 23.1%). The average age of persons injured from an assault was 34.9 years.

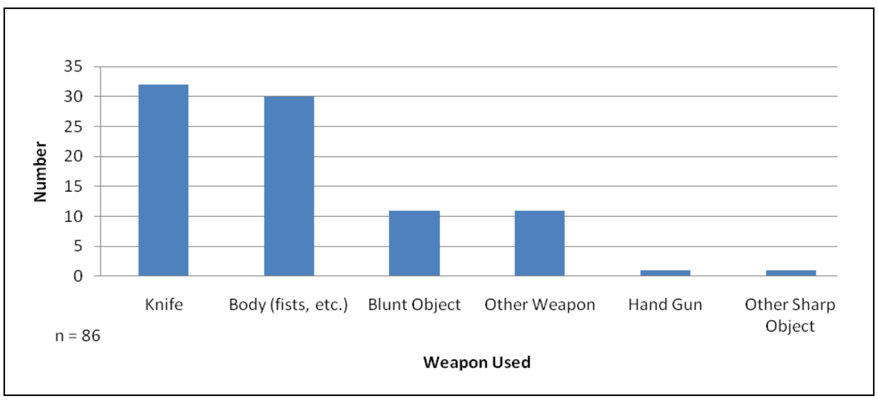
The assault type (fight / attack, domestic, other) was documented for 69 assault injury cases (66.3%). As illustrated in Figure 13, males sustained 50 cases (72.5%) and females sustained 19 cases (27.5%).

Figure 13: Distribution of Assault Type by Gender, [redacted] Service Unit, 2001 – 2005.



The weapon used to injure assault victims was known for 86 assault injury cases (82.7%). As illustrated in Figure 14, knives were the most common weapon used (32; 37.2%), followed closely by the assailant's body (fists, etc.) (30; 34.9%). Other weapons used were blunt objects (11; 12.8%), "other" objects (11; 12.8%), hand guns (1; 1.2%), and other sharp objects (1; 1.2%).

Figure 14. Distribution of Weapons Used in Assault Injuries, [redacted] Service Unit, 2001 – 2005.



The relationship of the assailant to the assault victim was known for 41 assault injury cases (39.4%). Of these, the leading assailant was a spouse / boyfriend / girlfriend (16; 39%), an acquaintance (6; 14.6%), another relative (6; 14.6%), a sibling (5; 12.2%), a stranger (4; 9.8%), and another person responsible (4; 9.8%).

Of the 104 assault injuries, 88 cases (84.6%) provided an indication regarding alcohol involvement. Of these, 77 cases (74%) were alcohol-related and 11 cases (10.6%) were not.

As previously mentioned, there were 11 fatal assault injuries, all of which were males. The age was known for 10 of the assault victims (90.9%). The average age of the assault victims was 34.3 years.

The weapon used was known for 10 of the fatal assaults cases (90.9%). The assailant's body was responsible for 5 cases (50%), followed by knives (4; 40%), and a hand gun (1; 1%).

The relationship of the assailant to the fatal assault victim was documented for 9 of the 11 fatal assault cases (81.8%). Of these, the leading assailant was an "other" (4; 44.4%), followed by an acquaintance (2; 22.2%), a stranger (2; 22.2%), and a sibling (1; 11.1%).

Of the 11 fatal assault injuries, alcohol was involved in the majority of cases (8; 72.7%). Alcohol involvement was unknown for the remainder of cases (3; 27.2%).

Motor Vehicle Crash Injuries

MVC injuries were the second leading type of severe injury at the [redacted]SU. There were 89 MVC injuries, of which 22 were fatal.

A greater number of male drivers sustained MVC injuries (49; 55.1%) than female drivers (40; 44.9%). The age of the injured was documented for 88 cases (98.9%). Of these, the average age of injured driver was 30.9 years. Adult drivers (18 - 65 years old) had the highest severe injury cases (59; 66.3%), followed by children (0 - 17 years) (26; 29.2%), and the elderly (66+ years old) (3; 3.4%).

MVC injuries were reviewed by roadway of occurrence. The roadway where the injury occurred was determined for 40 cases (44.9%), although more MVC injuries occurred on unspecified roads throughout the [redacted] (49; 55.1%). The majority of known MVC injuries occurred on State Route (SR) [redacted] (18; 45%). Other roadways where injuries occurred were on "other" roadways (9; 22.5%), BIA Route [redacted] (4; 10%), BIA [redacted] (2; 5%), BIA [redacted] (2; 5%), SR [redacted] (2; 5%), BIA [redacted] (1; 2.5%), BIA [redacted] (1; 2.5%), and US-[redacted] (1; 2.5%).

The data were also examined by milepost to determine potential cluster crash sites on the roadways. No cluster crash sites were observed.

The type of vehicle collision was documented for 87cases (97.8%). Of these, 51 cases (58.6%) resulted from single vehicle collisions and 15 cases (17.2%) from multiple vehicle collisions. No other observable trends were identified by type of vehicle collision.

Of the 89 MVC injuries, 84 cases (94.4%) had information about seat belt use. Of these, 6 cases (7.1%) were wearing seatbelts or helmets and 70 cases (83.3%) were not. Additionally, 83 cases (93.3%) provided an indication regarding alcohol involvement. Of these, 55 cases (66.3%) involved alcohol and 28 cases (33.7%) did not.

As previously mentioned, there were 22 fatal MVC injuries. A greater number of male drivers sustained fatal MVC injuries (12; 54.5%) than female drivers (10; 45.4%). The age of fatally injured drivers could be determined for 21 cases (95.5%). Of these, the average age of the victims was 28.3 years.

The fatal MVC injuries were reviewed by roadway of occurrence. Of these, the majority of cases occurred on SR [redacted] (11; 50%). Other fatal MVC injuries were sustained sporadically on SR and BIA roadways throughout the [redacted].

The fatal MVC data were examined by milepost to determine potential cluster crash sites on the roadways. No cluster crash sites were observed.

Of the 22 fatal MVC injuries, 19 cases (86.6%) had information about seat belt use. Of these, 1 case (5.3%) was wearing their seatbelt and 18 cases (94.7%) were not. Additionally, alcohol use could be determined for 19 of the fatal MVC injury cases (86.4%). Of these, 13 cases (68.4%) involved alcohol and 6 cases (31.6%) did not.

Fall Injuries

Falls were the third leading type of severe injury at the [redacted]SU. There were 85 fall injuries, of which 3 were fatal.

A greater number of males sustained fall injuries (50; 58.8%) than females (35; 41.2%). The age of the victim was documented for 84 cases (98.8%). Of these, the average age of persons injured from a fall was 40.8 years.

The fall injuries were classified into two types: same level falls and different level falls. The fall type was documented for 79 cases (92.9%). Of these, 41 cases (51.9%) were different level falls and 38 cases (48.1%) were same level falls.

The fall injuries were examined according to their place of occurrence. For same level falls, the place of occurrence for the injury was documented for 36 cases (94.7%). Of these, the majority of falls occurred while walking or hiking (11; 29.7%). The other most common locations occurred at another same level (9; 25%) and around the outside of the house (6; 8.3%). For different level falls, the place of occurrence for the injury could be determined for all 41 cases. Of these, the majority of falls occurred while falling from another different level (25; 61%). The other most common locations occurred while falling off a horse or another animal (6; 14.6%) and from a ladder (3; 7.3%).

Of the 85 severe fall injuries, 82 cases (96.4%) provided an indication regarding alcohol involvement. Of these, 37 cases (45.1%) were alcohol-related and 45 cases (54.8%) were not. All three fatal falls were alcohol-related.

Discussion and Recommendations

The ability to describe the leading types of severe injury and contributing factors is essential to the development of community specific injury prevention initiatives. Injury data from the SISS indicate assault injuries were the leading type of severe injury, followed by MVC, falls, "other," suicide / self-inflicted, fire / burn, and drowning. Additionally, the contributing factors with respect to age, gender, time, severity, alcohol involvement, and other variables were described to further understand the risk of injury. The following recommendations serve to promote public health activities associated with the prevention of injuries within the [redacted]SU:

- Continue to implement effective injury prevention strategies that focus on the prevention of assault injuries on the [redacted], but also consider projects that focus on the prevention of MVC and fall injuries.

- Continue to proactively work with the [redacted] Tribe to develop and implement community injury prevention projects that focus on the leading types of severe injuries for the [redacted]SU. Encourage Tribal leaders to support the Injury Prevention Coordinator with efforts throughout the reservation.

- Continue to implement a community-based injury prevention program by conducting activities that involve public health assessments, special projects, coalitions / collaborations, and training.

Questions regarding this report or any other injury prevention issues can be directed to the [redacted] Service Unit Office of Environmental Health and Engineering at ([redacted]) [redacted]-[redacted].

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4. Centers for Medicare and Medicaid Services, Health Indicators: Medical Care Prices, USDHHS, www.cms.hhs.gov/statistics/health-indicators/analysispart2.asp, March 23, 2003.

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AAO SEVERE INJURY

SURVEILLANCE SYSTEM

2012

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Severe Injury Surveillance System
Aberdeen Area IHS
OEHE/DEHS

Introduction

The Severe Injury Surveillance System (SISS) utilizes local health care data to develop a picture of each IHS Service Unit's injury problem. The system is implemented by tribal and IHS environmental health staff at the local level.

For clarifications and guidance about specific data collection, entry, management, and analysis; please refer to the Data Collection, Clarification, Entry, and Definition Guide.

Case Definition

A **severe injury** is defined as an injury that can be coded within the external cause (E-code) range of 800 – 999 of the International Classification of Diseases (ICD) Code Book **and** results in one of the following medical conditions:

- Amputation
- Loss of Consciousness (LOC)
- Fracture (excludes fingers/toes {phalanges}; includes ribs and nose)
- Hospitalization for at least one day
- Death

Injury Classification

Health care facility records classify injuries according to the International Classification for Diseases coding scheme developed by the World Health Organization. Currently, health care facilities in the Aberdeen Area use the ninth version of the ICD coding scheme. The ICD9 classifies injuries in two ways: by the external cause of injury code known as the E-code; and by the nature of injury code known as the N-code. The E-code describes the circumstances under which the injury occurred. The E-coding system is specific enough to capture the mechanism, intent, and physical location of occurrence of the injury; the codes range from 800-999. The N-code describes the injury or physiological outcome resulting from the injury event; N-codes for injuries range from 800-995.

The external cause of injury data collected and reported by the SISS is based on the E-coding classification system. The SISS collapses the ICD9 external cause of injury codes into seven smaller categories. The seven external causes of injury and their corresponding E-code ranges are in the following table.

External Injury Cause	E-code Range
Motor Vehicle Crash (MVC)	810 – 829
Fall	880 – 888
Fire	890 – 899
Drowning	910 – 910.9
Suicide	950 – 959
Assault	960 – 969
Other (All other injuries not elsewhere assigned an external injury cause.)	800 – 999

(Often times, external cause of injury codes are not captured in Aberdeen Area health care facility records. If a case has not been assigned an E-code in the medical record, the field staff decides in which external cause of injury category the case will be counted. The staff will make this determination by: reviewing a patient's medical record; and applying the ICD9 definitions for the corresponding e-code range to determine in which of the seven categories the case will be counted.)

The nature of injury data collected and reported by the SISS is based on the ICD9 N-coding classification system. The SISS collapses the ICD9 nature of injury codes into twenty smaller categories. The 20 categories for nature of injury and their corresponding N-code ranges are below.

Nature of Injury Description	N-code Range
Fracture of the skull	800 – 804
Fracture of the spine and trunk	805 - 809
Fracture of the upper limb	810 – 819
Fracture of the lower limb	820 – 829
Dislocation	830 – 839
Intracranial injury (excludes those with skull fracture)	850 – 854
Internal injury of chest, abdomen, and pelvis	860 – 869
Open wound of head, neck, and trunk	870 – 879
Open wound of upper limb	880 – 887
Open wound of lower limb	890 – 897
Injury to blood vessels	900 – 904
Late effects of injuries, poisonings, toxic effect and other external causes	905 – 909
Crushing injury	925 – 929
Effects of foreign body entering through orifice	930 – 939
Burns	940 – 949
Injury to nerves and spinal cord	950 – 957
Certain traumatic complications and unspecified injuries	958 – 959
Poisoning by drugs, medicinal and biological substances	960 – 979
Toxic effects of substances chiefly non-medicinal as to source	980 – 989
Other and unspecified effects of external cause - Drowning = 994.1	990 - 995

Case Identification

Potential severe injury cases are identified by screening the:

- Emergency Room Log
- Resource Patient Management System (RPMS) Visit General Query (VGEN)
- Contract Health Service Records
    - Minutes or log
    - Denials
    - RPMS Cimarron Query

Once a potential case is identified, the date of visit, medical record number, patient name, and circumstances of the injury event are collected (if available) and recorded in the Master Case Log for tracking purposes. They may be imported, selected/sorted, and stored using the MS Excel spreadsheet system developed by Terrold Menzie. A template for the Master Case Log is attached as Appendix A and some locations are using MS Excel spreadsheets for their Master Case Log.

The identified potential case's medical record is then reviewed to determine if the case definition is met. Findings are noted in the Master Case Log.

Data Abstraction
Once it is determined that the case definition is met, data is abstracted from the medical record and entered on the data collection form (Appendix B). The document "Data Collection Clarification, Entry, and Definition Guide" is attached as Appendix C and provides guidance for each variable on the data collection form as well as clarifications.

The following documents in the medical record are useful when abstracting injury data:

- Patient Care Component Ambulatory Encounter Record (PCC)
    - The PCC is the Indian Health Service version of:
        - Ambulatory Care Record Brief
        - Clinical Record Brief
        - Emergency Room Visit Record
- Emergency Medical Services Run Sheets
- Discharge Summary
- Other
    - X-ray Report
    - Lab Report

Data Entry and Management
The software program Epi Info serves as the electronic database for the SISS. The staff member(s) collecting data enter it and maintain an electronic backup of the data. A guidance document, "Standard Operating Procedure for Epi Info for Windows", is attached in Appendix D. This document includes a section about data entry and should be referenced when entering data.

Data Cleaning, Analysis, and Reporting

- Data Cleaning:
  The document, "Cleaning Data for Epi Info", was developed in 2006 and provided guidance on cleaning data in Epi Info. A similar document will be developed and provided to staff prior to August 1, 2007 to aid in the data cleaning process.

- Data Analysis:
  The document, "Steps for Generating Output in Epi Info", was developed in 2006 and provided the necessary information to prepare a standard report at each location. A similar document will be prepared by September 1, 2007 to aid in the data analysis and reporting process.

- Data Reporting:
  A standard format for local Severe Injury Profiles was provided in 2006 to staff. A similar format will be developed and provided to staff by September 1, 2007. Each location will utilize the standard format for providing a severe injury data report to the

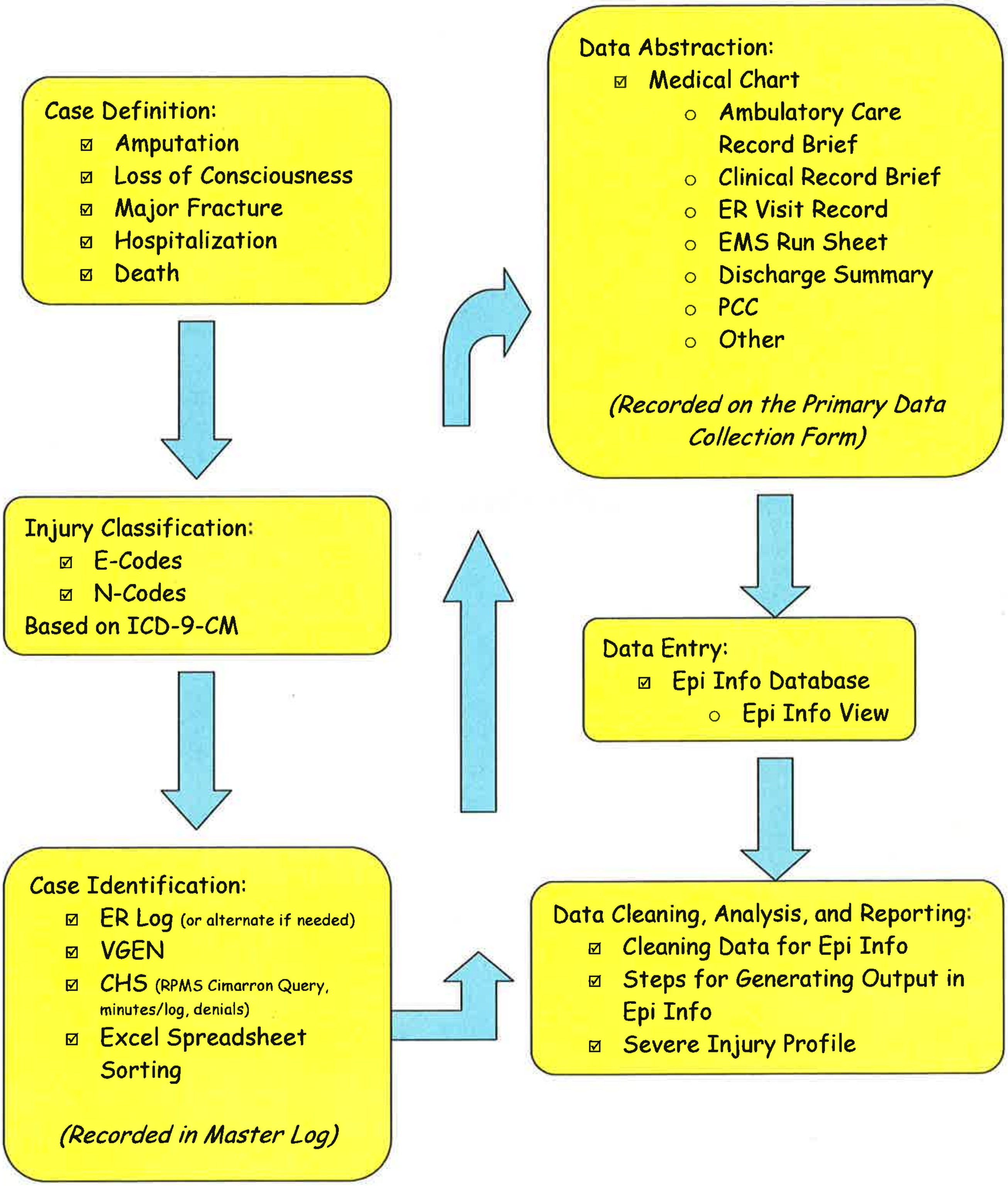
tribe, IHS Service Unit Leadership, and Division of Environmental Health Service Management.

Confidentiality
All provisions of the Privacy Act and Health Insurance Portability and Accountability Act (HIPAA) are followed since our data collection forms, Master Case Log, and other documents contain personal identifiers. When questions arise concerning the Privacy Act or HIPAA, the local Privacy Act Coordinator should be contacted.

Limitations
This Severe Injury Surveillance System has limitations. The limitations include:

- Cost estimates vary by service unit
- The potential to miss fatal cases – those not triaged at an IHS facility
- The inability to capture cases where treatment is sought at non-IHS facility and payment is not made by IHS
- The inability to capture cases for which there is no information indicating that it meets the case definition in this protocol

Severe Injury Surveillance System Flow Chart



Revised June 8, 2007

Lower Brule Severe Injury Highlights for the 2005 & 2007 CYs

Background-

According to the Centers for Disease Control and Prevention (CDC) injuries are the leading cause of death for Native Americans in the 1 to 44 age group. Injuries are the third leading cause of death for all ages for Native Americans. In order for the tribes to enact preventive measures, causative data needs to be gathered. This profile summarizes the data gathered through the Aberdeen Area Severe Injury Surveillance System (SISS) for the Lower Brule IHS for the calendar years of 2005-2007. The SISS allows environmental health staff to identify, investigate and maintain an informational database on cases of severe injuries.

The SISS aims to identify all new cases of severe injury occurring at the service unit level for a calendar year through the review of IHS healthcare facility medical records and state death records. The primary objective of the SISS is to identify the leading cause of severe injuries by service unit.

Methods-

For the purposes of the Aberdeen Area SISS, a severe injury is defined as an injury resulting in one of the following: amputation; loss of consciousness; major fracture; hospitalization for at least one day in an IHS hospital or contract facility, or fatality. Sources of information for identifying cases of severe injury include; contract health care Facility Data records, Resource Patient Management System (RPMS) records, CHS Denial Data, state death records, and hospital ER logs.

Once a case has been identified, descriptive information about the nature, disposition of patient, and circumstance surrounding the severe injury is gathered and recorded. In addition to death and medical records, police records may be accessed to gather the descriptive information.

In this profile-

This profile is formatted to report both morbidity and mortality data. The morbidity report includes only those who suffered a severe injury that did not result in death.

Severe Injury Overview By Cause-

The graph below shows the leading causes of severe injuries at Lower Brule IHS during 2005-2007 CYs.

Numbers of Injuries by Cause

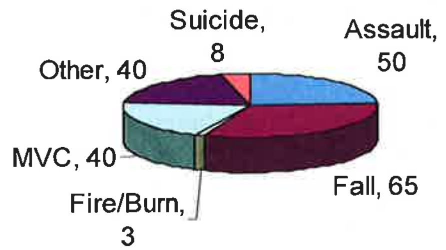


Figure 1 percentage of Severe Injuries by Cause N=206

Table 1. Number of severe injuries by gender, disposition of patient, intent, and alcohol use, 2005-2007 N = 206

Gender	*Frequency*	*Percentage*
Male	110	53.4
Female	96	46.6
Disposition of patient		
Outpatient	123	59.7
Hospitalized	79	38.3
DOA	3	1.5
Unknown	1	0.5
Intent		
Unintentional	148	71.8
Intentional	58	28.2
Alcohol related [1]		
No	88	42.7
Yes	72	35.0
Unknown	25	12.1
Missing	21	10.2

[1] Alcohol-related injuries were difficult to assess because data collectors reviewed a subjective assessment of alcohol involvement by health personnel. In very few cases were BACs obtained. Also not all yes's were confirmed with BACs and not all No's were tested in the patient population.

The 2007 severe injuries continue to show that males are the most frequent recipients of severe injuries and that alcohol is a factor in contributing to the injuries. For the first time since keeping track, 'Assault' injuries are the number 1 cause on the Lower Brule Reservation.

Assaults N=50 $303,304.51

Assaults have increased in number and severity and in 2007 they outnumbered Falls in causing severe injuries on the Lower Brule Indian Reservation. The increase in Assaults goes from 11 in 05, to 14 in 06, and then to 25 in 07. This increase in number has been more than matched by the increase in cost going from 23K in 05, 67K in 06, and finally to a whopping 213K in 07. Coinciding with this the BIA Police Department has observed an increase in gang activity and this may have contributed to these increases. At a cost of $6,066.09 per injury, 'Assault' injuries are surpassed only by the cost per injury of MVC's. Tables 2 and 3 lists the finding for 'Assault' injuries.

Table 2. Number of cases of Assault Injuries by Age Group and Gender. N = 50

Age Group	*Male*		*Female*		*Totals*	
	#	%	#	%	#	%
10 – 14 yrs	1	2.0	0	0.0	1	2.0
15 – 24 yrs	14	28.0	7	14.0	21	42.0
25 – 34 yrs	9	18.0	7	14.0	16	32.0
35 – 44 yrs	5	10.0	1	2.0	6	12.0
45 – 54 yrs	1	2.0	3	6.0	4	8.0
55 – 64 yrs	0	0.0	1	2.0	1	2.0
65 yrs plus	1	2.0	0	0.0	1	2.0

Table 2 shows the age group of 15 to 34 are greatly impacted by Assault injuries and are mostly attributable to males. The table also suggests that after the age of 14, as you get older, your risk of being assaulted declines.

Table 3. Number of cases of Assaults by disposition of patient and alcohol. N = 50

Disposition of patient	*Frequency*	*Percentage*
Outpatient	30	60.0%
Hospitalized	19	38.0%
Fatality	1	2.0%
Alcohol related		
Yes	38	76.0%
Unknown	8	16.0%
No	3	6.0%
Missing	1	2.0%

Table 3 provides evidence that alcohol use is a major contributor to the cause behind Assault injuries and that 38% are hospitalized for their injury.

Falls N=65 $137,685.97

Coming in at first place in number for the leading cause of severe injuries is 'Falls' where a cost of $2,118.25 was spent on average for each 'Fall' injury. The number of falls for each year was somewhat erratic, as demonstrated by the fact that 05 saw 17, 06 had 28, and in 07 the number dropped back down to 20. This would suggest that the variables influencing 'Falls' seem to change drastically from year to year. Tables 4 and 5 lists the finding for 'Fall' injuries.

Table 4. Number of cases of Fall Injuries by Age Group and Gender. N = 65

Age Group	*Male*		*Female*		*Totals*	
	#	%	#	%	#	%
0 – 4 yrs	2	3.1	6	9.2	8	12.3
5 – 9 yrs	2	3.1	1	1.5	3	4.6
10 – 14 yrs	3	4.6	1	1.5	4	6.2
15 – 24 yrs	7	10.8	5	7.7	12	18.5
25 – 34 yrs	3	4.6	7	10.8	10	15.4
35 – 44 yrs	3	4.6	5	7.7	8	12.3
45 – 54 yrs	6	9.2	3	4.6	9	13.8
55 – 64 yrs	2	3.1	3	4.6	5	7.7
65 yrs plus	0	0.0	6	9.2	6	9.2

'Falls' had a 43:57 split between Males and Females in the three years but had a 10:10 ratio for 2007.

Table 5. Number of cases of Falls by disposition of patient and alcohol. N = 65

Disposition of patient	*Frequency*	*Percentage*
Outpatient	50	76.9%
Hospitalized	15	23.1%
Alcohol related		
No	40	61.5%
Missing	12	18.5%
Yes	7	10.8%
Unknown	6	9.2%

Table 5 clearly shows that alcohol was not a key factor in contributing to 'Falls' in that only 1 of every 10 'Fall' injury was alcohol related. The type of care most often provided was that of an 'Outpatient' visit.

MVCs N=40 $363,094.60

With 14 severe MVC injuries in 2007, the numbers are continuing to fluctuate but the severity and cost has risen dramatically over the previous 2 years where the cost has gone form 25K in 05, to 64K in 06, and finally to 274K in 07. A number of these have resulted in cases that will require long term care. So the cost of these injuries will actually increase over the years to come. $9,077.37 was the price paid for each 'MVC' severe injury, putting it at the top for severity. Tables 6 and 7 lists the finding for 'MVC' injuries.

Table 6. Number of cases of MVC Injuries by Age Group and Gender. N = 40						
Age Group	*Male*		*Female*		*Totals*	
	#	%	#	%	#	%
0 – 4 yrs	2	5.0	1	2.5	3	7.5
5 – 9 yrs	1	2.5	0	0.0	1	2.5
10 – 14 yrs	4	10.0	2	5.0	6	15.0
15 – 24 yrs	5	12.5	3	7.5	8	20.0
25 – 34 yrs	5	12.5	5	12.5	10	25.0
35 – 44 yrs	1	2.5	3	7.5	4	10.0
45 – 54 yrs	3	7.5	2	5.0	5	12.5
55 – 64 yrs	1	2.5	0	0.0	1	2.5
65 yrs plus	2	5.0	0	0.0	2	5.0

As table 6 above shows, the young are most often the ones injured by an MVC and roughly 70% of them occur to those in the age group from 0 to 34. Any efforts made to reduce MVC's should be targeted at this age group.

Table 7. Number of cases of MVC by disposition of patient and alcohol. N = 40		
Disposition of patient	*Frequency*	*Percentage*
Hospitalized	22	55.0%
Outpatient	15	37.5%
Fatality	2	5.0%
Unknown	1	2.5%
Alcohol related		
Yes	18	45.0%
No	14	35.0%
Unknown	5	12.5%
Missing	3	7.5%

Alcohol, as the table shows, was a significant factor as a cause for MVC injuries coming in at 45.0%. As a result of the greater severity of the injuries, the most frequent result of care provided for an MVC injury ends in a hospitalization.

Others Injuries N=40 $47,012.81

The low number of 'Other' types of injuries suggests that the clinic is getting better data for which to make an evaluation. This should aid in focusing the efforts put forth to further reduce th number. Tables 8 and 9 list the findings for 'Other' injuries.

Table 8. Number of cases of Other Injuries by Age Group and Gender. N = 40						
Age Group	*Male*		*Female*		*Totals*	
	#	%	#	%	#	%
0 – 4 yrs	1	2.5	1	2.5	2	5.0
5 – 9 yrs	2	5.0	1	2.5	3	7.5
10 – 14 yrs	3	7.5	5	12.5	8	20.0
15 – 24 yrs	9	22.5	3	7.5	12	30.0
25 – 34 yrs	4	10.0	3	7.5	7	17.5
35 – 44 yrs	4	10.0	0	0.0	4	10.0
45 – 54 yrs	1	2.5	2	5.0	3	7.5
65 yrs plus	0	0.0	1	2.5	1	2.5

Like most of the other causes, the age group that contributed to the number was found to be between the ages of 10 to 44 and to males.

Table 9. Number of cases of Others by disposition of patient and alcohol. N = 40		
Disposition of patient	*Frequency*	*Percentage*
Hospitalized	27	67.5%
Outpatient	13	32.5%
Alcohol related		
No	29	72.5%
Unknown	5	12.5%
Yes	3	7.5%
Missing	3	7.5

In an ironic twist, the one alcohol related severe injury from the 'Other' category in 2007 resulted when an individual continued his drinking by switching to rubbing alcohol after his beer supply had ran out. This led him to a hospital stay.

Suicide Injuries N=8 $40,593.88

Suicide injuries still demand a high price per injury. Cost with an average of $5,074.61 places it at the 4th costly injury. Tables 10 and 11 list the findings for 'Suicide' injuries.

Table 10. Number of cases of Suicide Injuries by Age Group and Gender. N = 8						
Age Group	*Male*		*Female*		*Totals*	
	#	%	#	%	#	%
15 – 24 yrs	1	12.5	4	50.0	5	62.5
25 – 34 yrs	0	0.0	2	25.0	2	25.0
35 – 44 yrs	0	0.0	1	12.5	1	12.5

Females continue to suffer a higher degree of suicides than males with the age group of 15 to 44 at most risk.

Table 11. Number of cases of Suicides by disposition of patient and alcohol. N = 8		
Disposition of patient	*Frequency*	*Percentage*
Hospitalized	8	100.0
Alcohol related		
Yes	5	62.5%
Missing	2	25.0%
Unknown	1	12.5%

As is most often the case for 'Suicide' injuries, the result is a hospital stay with alcohol playing a key role in the cause.

Other Significant Findings-

66% of the 'Assault' injuries became classified as severe due to the fact that a bone was fractured. These 33 fractures included 22 skull fractures, 2 spinal fractures, 5 arm fractures, and 5 fractures of the leg. 2007, while it didn't have a fatality like 2006, it did skyrocket in the numbers of assaults. Each severe assault injury cost an average of $6,066.09 to treat. It was a curious note that was observed when it was discovered that for the three years that assault injuries have been tracked, not one has occurred in the month of December.

MVC injuries nearly cost over $9,000.00 a shot. The trend is somewhat staying the same in numbers. Unfortunately the use of seat belts is still very low and this is resulting in the higher cost per injury.

In total, nearly $520,000,000.00 was spent on severe injuries occurring to residents on the Lower Brule Sioux Reservation just in 2007. Better record keeping by the clinic and a new program being used is making the collection of information on these injuries more accurate and is part of the reason for the increase in the costs but also a factor is the higher number of hospitalization due to the increased severity of the injuries. The clinic clearly doesn't have the budget for this increase and has had to make adjustments.

Limitations-

The Aberdeen Area SISS may miss fatal cases not triaged through the health centers. The system does not capture cases (with the exception of fractures, loss of consciousness, and amputations) for which there was no information indicating hospitalization or death. The SISS data was supplemented with fatality data from the South Dakota Department of Health.

Recommendations-

Clearly the cost of these injuries is putting a severe impact on the care that can be provided and every effort should be made to decrease this recent trend.

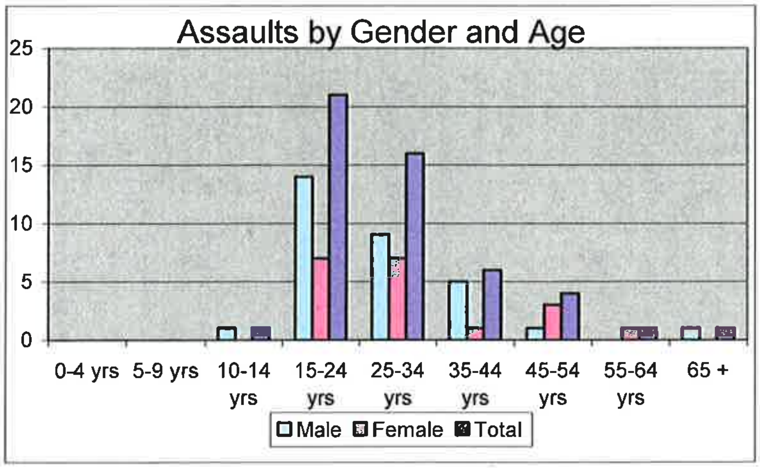
Since alcohol plays such an important role, all attempts to decrease its use, its impact, and it accessibility should be explored. Community wide education and alcohol free celebrations should become common. Enforcement of underage drinking laws and penalties against parents that allow their underage children to drink are possible steps that could be taken to make this community alcohol free and thereby decrease the number of severe injuries.

The roadways on the reservation have undergone some major engineering improvements in the past few years. Although this has helped to lessen the number, education on seat belt use, enforcement of laws requiring seat belts, and environmental changes may be needed to lessen the severity of these injuries due to MVC's.

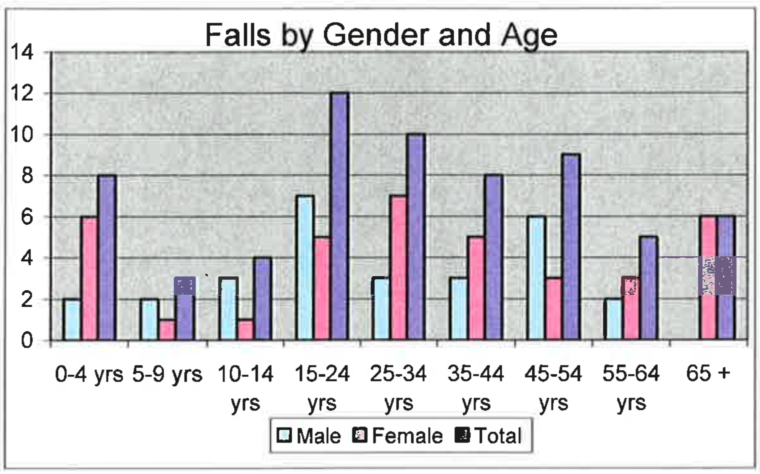
Fatality Data-

In the three years collected, 2 individuals died of injuries sustained in a MVC and one due to an assault. Each was within 4 years of their 30^{th} birthday and only one could be confirmed as alcohol related. The other two had missing data or could not be determined from the information collected.

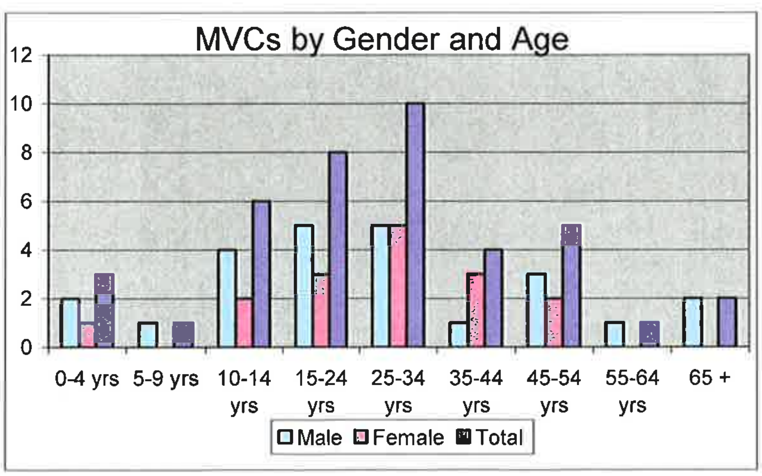
Additional Graphs/Data-



The graph to the left shows the age groupings for "Assault" injuries with the males and females for each group.



The graph to the left shows the age groupings for "Falls" injuries with the males and females for each group.



The graph to the left shows the age groupings for "MVCs" injuries with the males and females for each group.

Your Tribe/Service Unit Severe Injury Highlights 2005

Background- According to the Centers for Disease Control and Prevention (CDC) injuries are the leading cause of death for Native Americans in the 1 to 44 age group. Injuries are the third leading cause of death for all ages for Native Americans. In order for the Tribes to enact preventive measures, causative data needs to be gathered. This profile summarizes the data gathered through the Aberdeen Area Severe Injury Surveillance System for the (Service Unit and location) for the calendar year 2005. The SISS allows environmental health staff to identify, investigate and maintain an informational database on cases of severe injury.

The SISS aims to identify all new cases of severe injury occurring at the service unit level for a calendar year through the review of IHS healthcare facility medical records and state death records. The primary objective of the SISS is to identify the leading cause of severe injury by service unit.

Methods

For the purposes of the Aberdeen Area SISS, a severe injury is defined as an injury resulting in one of the following: amputation; loss of consciousness; major fracture; hospitalization for at least one day in an IHS hospital or contract facility; or fatality. Sources of information for identifying cases of severe injury include; contract health care Facility Data records, Resource Patient Management System (RPMS) records, CHS Denial Data, state death records, and hospital ER logs.

Once a case has been identified descriptive information about the nature, severity, and circumstance surrounding the severe injury is gathered and recorded. In addition to death and medical records, police records may be accessed to gather the descriptive information.

In this profile

This profile is formatted to report both morbidity and mortality data. The morbidity report includes only those who suffered a severe injury that did not result in death.

Severe Injury Overview By Cause

The leading cause of severe injury at Your Site for 2005

Figure 1 percentage of Severe Injuries by Cause N=

Percent of Injury by Cause

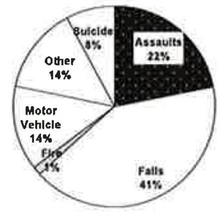


Table 1. Number of severe injuries by gender, severity of injury, intent, and alcohol use, 2005

Gender N=100	*Frequency*	*Percentage*
Male	61	61%
Female	39	38%
Severity N=100		
Outpatient	69	69%
Hospitalized	31	316%
Intent N=100)		
Unintentional		
Intentional		
Alcohol related(N=100[1]		
Yes		
No		
Unknown		

[1]Alcohol-related injuries were difficult to assess because data collectors reviewed a subjective assessment of alcohol involvement by health personnel. In very few cases were BACs obtained. Also not all yes's were confirmed with BACs and not all no's were tested in the patient population.

Table 1 indicates (state what is shown in the table)

Insert Specific Injury by Cause Data Next

The following tables are a description of the injury Causes by Age and Gender, Severity, and Alcohol Related.

For graphs see appendix

Falls

Falls were the leading cause of severe injury in 2005. Tables 2 and table 3 show findings for falls.

Table 2. Number of cases of Falls Injuries by age group and gender. 2005 N=

Age Group	*Male*	*Female*
0 – 4 yrs	5	9.2
5 -9 yrs	8.8	9.2
10 – 14 yrs	15.7	7.4
15 – 24 yrs	22.6	8
25 – 34 yrs	16.4	14.7
35 – 44 yrs	9.4	12.9
45 - 54 yrs	10.1	9.8
55 – 64 yrs	5	14.1
65 yrs plus	6.9	14.7

Table 2 shows that most of the falls occurred in males in the 10 to 34 age group.

Table 3. Number of cases of Falls by severity and alcohol.

Severity N =	*Frequency*	*Percentage*
Hospitalized		14.3
Outpatient		85.4
Alcohol involvement		
Alcohol Involved		10.2
Unconfirmed		66.1
Unknown		23.6

Table 3 shows that the majority of alcohol involvement is undetermined at health care facilities.

Motor Vehicle Crashes

You may be able to say that MVC injuries are more serious here or more costly. Table 4 and table 5 show findings for motor vehicle crashes.

Table 4. Percent of cases of Motor Vehicle Injuries by age group and gender. 2005 N=

Age Group	*Male*	*Female*
0 – 4 yrs	5	9.2
5 -9 yrs	8.8	9.2
10 – 14 yrs	15.7	7.4
15 – 24 yrs	22.6	8
25 – 34 yrs	16.4	14.7
35 – 44 yrs	9.4	12.9
45 - 54 yrs	10.1	9.8
55 – 64 yrs	5	14.1
65 yrs plus	6.9	14.7

Table 5. Number of cases of Motor Vehicle Injuries by severity and alcohol.

Severity N =)	*Frequency*	*Percentage*
Hospitalized		14.3
Outpatient		85.4
Alcohol involvement		
Alcohol Involved		10.2
Unconfirmed		66.1
Unknown		23.6

Assaults

Assault injuries. Table 6 and table 7 show findings for assault injuries.

Table 6. Number of cases of Assaults Injuries by age group and gender. 2005 N=

Age Group	*Male*	*Female*
0 – 4 yrs	5	9.2
5 -9 yrs	8.8	9.2
10 – 14 yrs	15.7	7.4
15 – 24 yrs	22.6	8
25 – 34 yrs	16.4	14.7
35 – 44 yrs	9.4	12.9
45 - 54 yrs	10.1	9.8
55 – 64 yrs	5	14.1
65 yrs plus	6.9	14.7

Table 6 shows Any of these tables may or may not show an age group has a higher percentage of assaults.

Table 7. Number of cases of assaults by severity and alcohol.

Severity N =)	*Frequency*	*Percentage*
Hospitalized		14.3
Outpatient		85.4
Alcohol involvement		
Alcohol Involved		10.2
Unconfirmed		66.1
Unknown		23.6

Table 7 state what the table shows.

Fire Injuries

Fire injuries. Table 8 and table 9 show findings for fire injuries.

Table 8. Percent of cases of Fire Injuries by age group and gender. 2005 N=

Age Group	*Male*	*Female*
0 – 4 yrs	5	9.2
5 -9 yrs	8.8	9.2
10 – 14 yrs	15.7	7.4
15 – 24 yrs	22.6	8
25 – 34 yrs	16.4	14.7
35 – 44 yrs	9.4	12.9
45 - 54 yrs	10.1	9.8
55 – 64 yrs	5	14.1
65 yrs plus	6.9	14.7

Table 9. Number of cases of Fire Injuries by severity and alcohol.

Severity N =	*Frequency*	*Percentage*
Hospitalized		14.3
Outpatient		85.4
Alcohol involvement N=		
Alcohol Involved		10.2
Unconfirmed		66.1
Unknown		23.6

Table 9 state what the table shows.

Suicide Injuries

Suicide injuries. Table 10 and table 11 show findings for suicide injuries.

Table 10. Percent of cases of Suicide Injuries by age group and gender. 2005 N=

Age Group	*Male*	*Female*
0 – 4 yrs	5	9.2
5 -9 yrs	8.8	9.2
10 – 14 yrs	15.7	7.4
15 – 24 yrs	22.6	8
25 – 34 yrs	16.4	14.7
35 – 44 yrs	9.4	12.9
45 - 54 yrs	10.1	9.8
55 – 64 yrs	5	14.1
65 yrs plus	6.9	14.7

Table 11. Number of cases of Suicide Injuries by severity and alcohol.

Severity N =	*Frequency*	*Percentage*
Hospitalized		14.3
Outpatient		85.4
Alcohol involvement		
Alcohol Involved		10.2
Unconfirmed		66.1
Unknown		23.6

Table 11 state what the table shows.

Other Injuries

Other injuries. Table 12 and table 13 show findings for other injuries.

Table 12. Percent of cases of Other Causes of Injuries by age group and gender. 2005 N=

Age Group	*Male*	*Female*
0 – 4 yrs	5	9.2
5 -9 yrs	8.8	9.2
10 – 14 yrs	15.7	7.4
15 – 24 yrs	22.6	8
25 – 34 yrs	16.4	14.7
35 – 44 yrs	9.4	12.9
45 - 54 yrs	10.1	9.8
55 – 64 yrs	5	14.1
65 yrs plus	6.9	14.7

Table 13. Number of cases of Other Causes by severity and alcohol.

Severity N =	*Frequency*	*Percentage*
Hospitalized		14.3
Outpatient		85.4
Alcohol involvement		
Alcohol Involved		10.2
Unconfirmed		66.1
Unknown		23.6

Table 13 state what the table shows.

Drowning Injuries

Drowning injuries. Table 14 and table 15 show findings for drowning injuries.

Table 14. Percent of cases of Drowning Injuries by age group and gender. 2005 N=

Age Group	*Male*	*Female*
0 – 4 yrs	5	9.2
5 -9 yrs	8.8	9.2
10 – 14 yrs	15.7	7.4
15 – 24 yrs	22.6	8
25 – 34 yrs	16.4	14.7
35 – 44 yrs	9.4	12.9
45 - 54 yrs	10.1	9.8
55 – 64 yrs	5	14.1
65 yrs plus	6.9	14.7

Table 15. Number of cases of Drowning Injuries by severity and alcohol.

Severity N =)	*Frequency*	*Percentage*
Hospitalized		14.3
Outpatient		85.4
Alcohol involvement		
Alcohol Involved		10.2
Unconfirmed		66.1
Jnknown		23.6

Table 15 State what the table shows.

Other Significant Findings

Limitations

The Aberdeen Area SISS may miss fatal cases not triaged through the hospital. The system does not capture cases (with the exception of fractures, loss of consciousness, and amputations) for which there was no information indicating hospitalization or death. The SISS data were supplemented with fatality data from the South Dakota/North Dakota Department of Health.

Recommendations

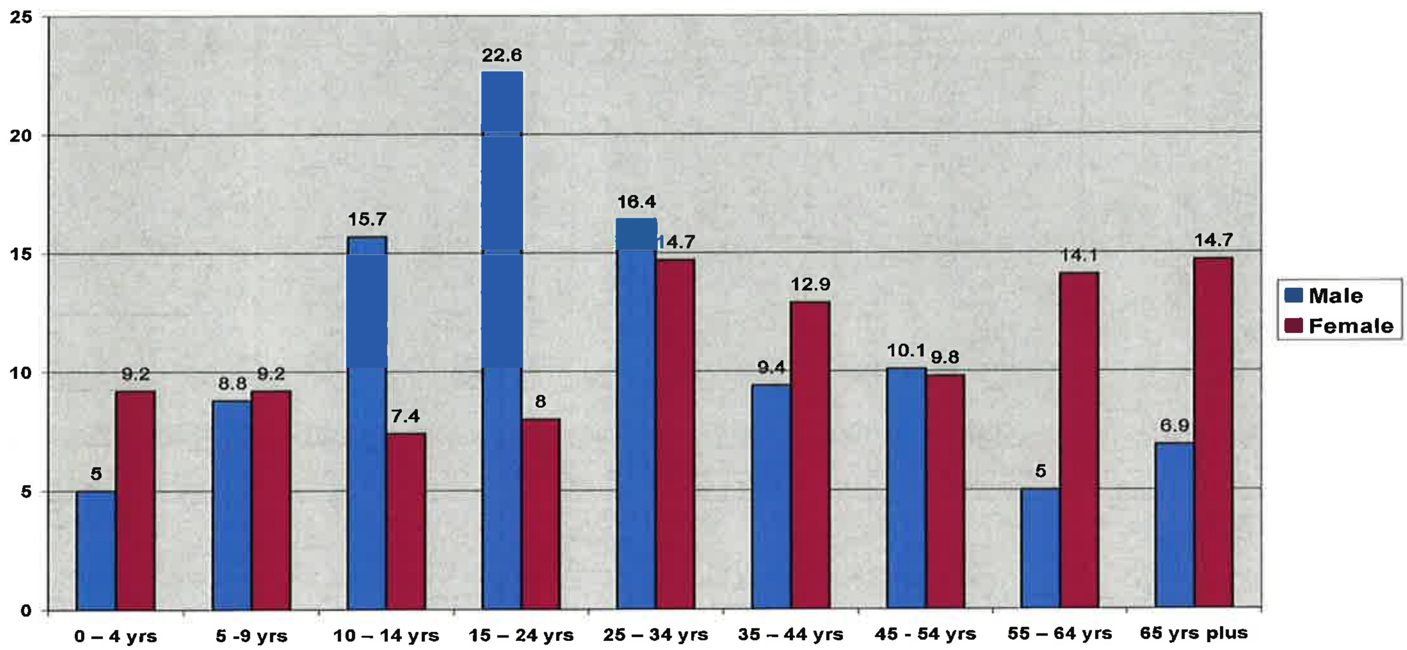
More information needs to be gathered related to rates for cause by gender and age. Also the health care facilities need a standard protocol to determine if alcohol is a factor in injuries.

Insert Mortality Data Here

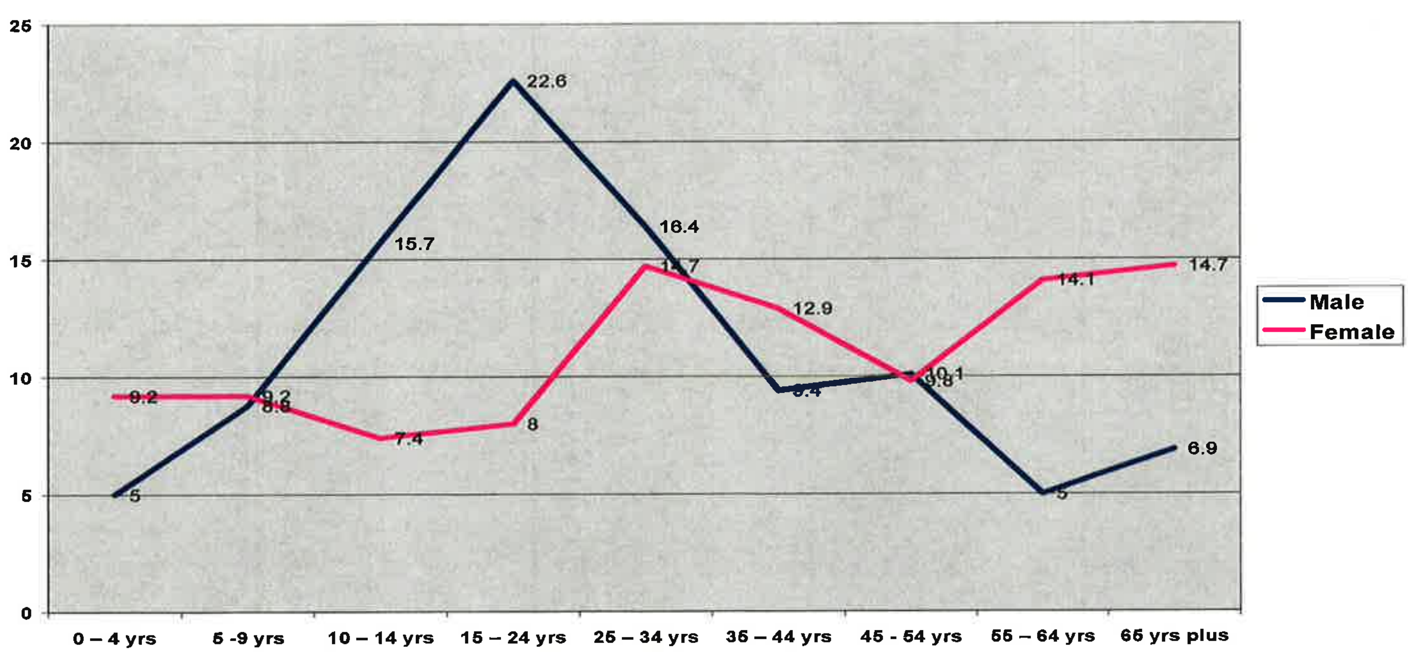
Use five years of data 2001 through 2005 from the state information. You may want to use the same Cause grouping as you used in the SISS to display your mortality data.

Sample Charts

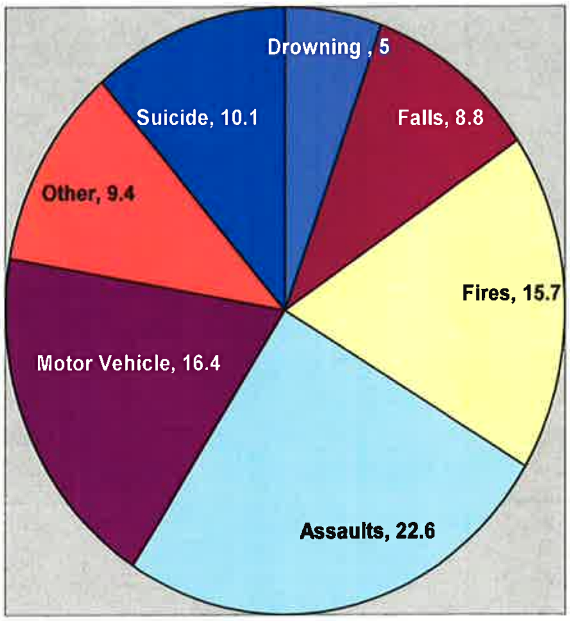
Percent of Fall Injuries by Gender
Your Service Unit for 2005



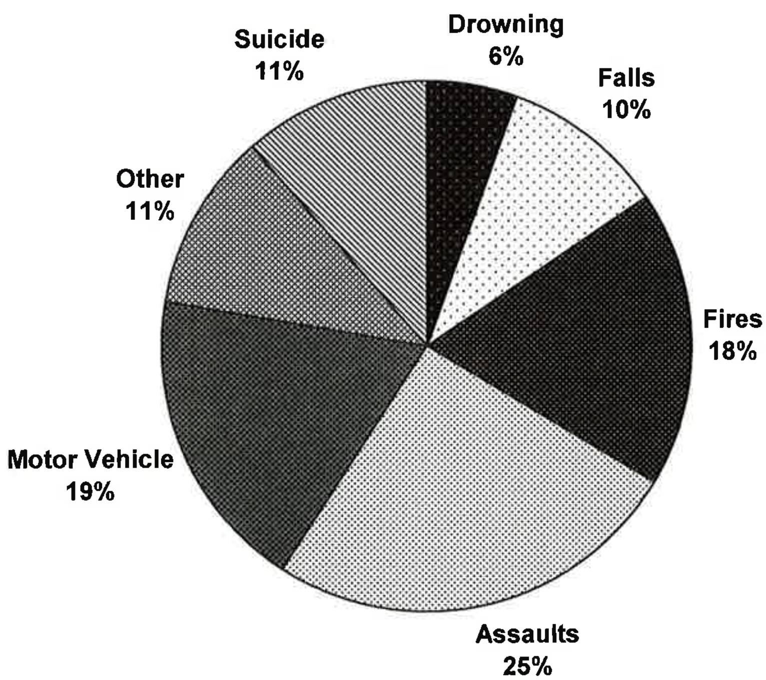
Percent oFall Injuries by Gender
Your Service Unit for 2005



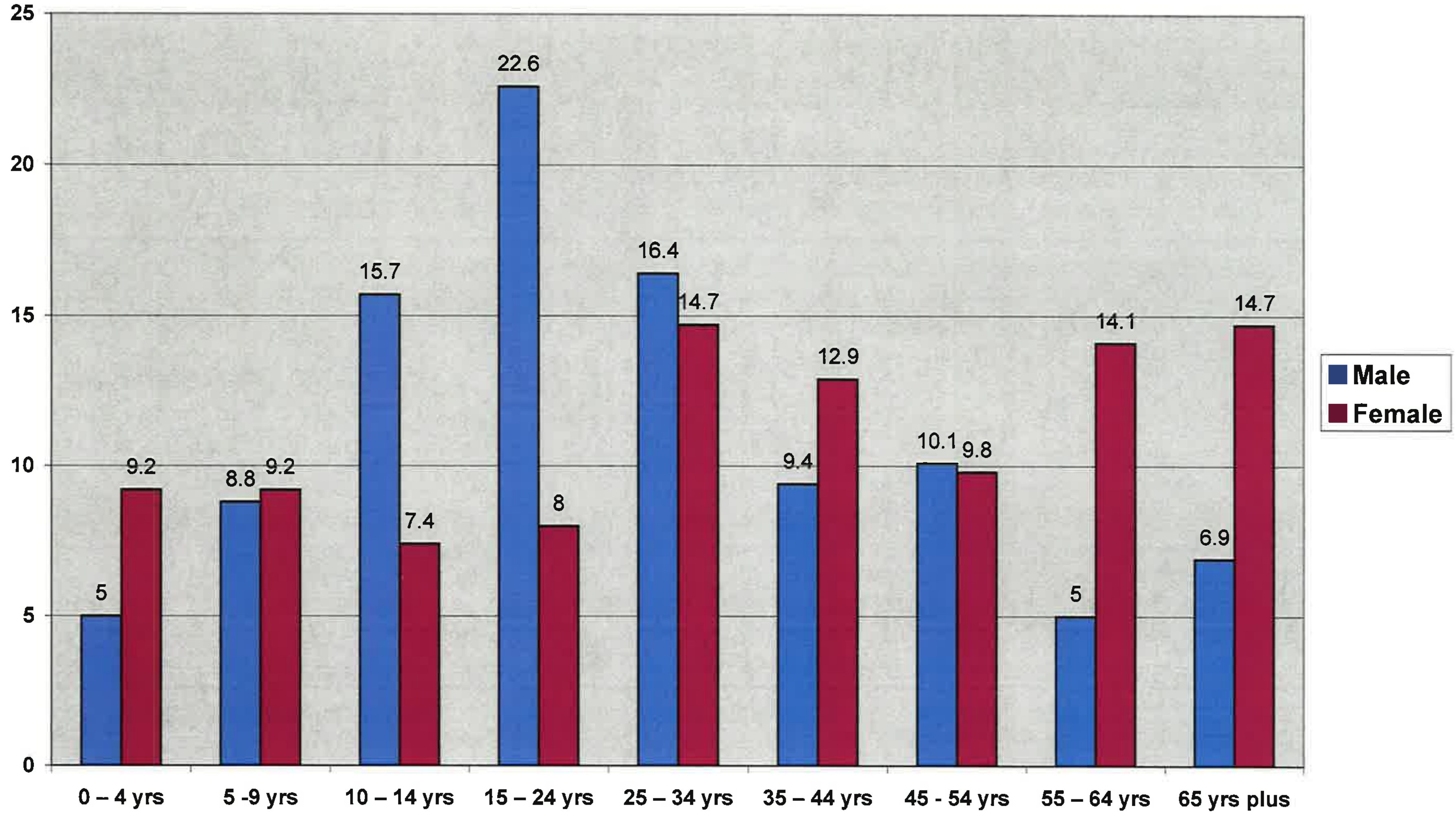
Percent of Injuries by Cause
2005



Percent of Injuries by Cause
2005

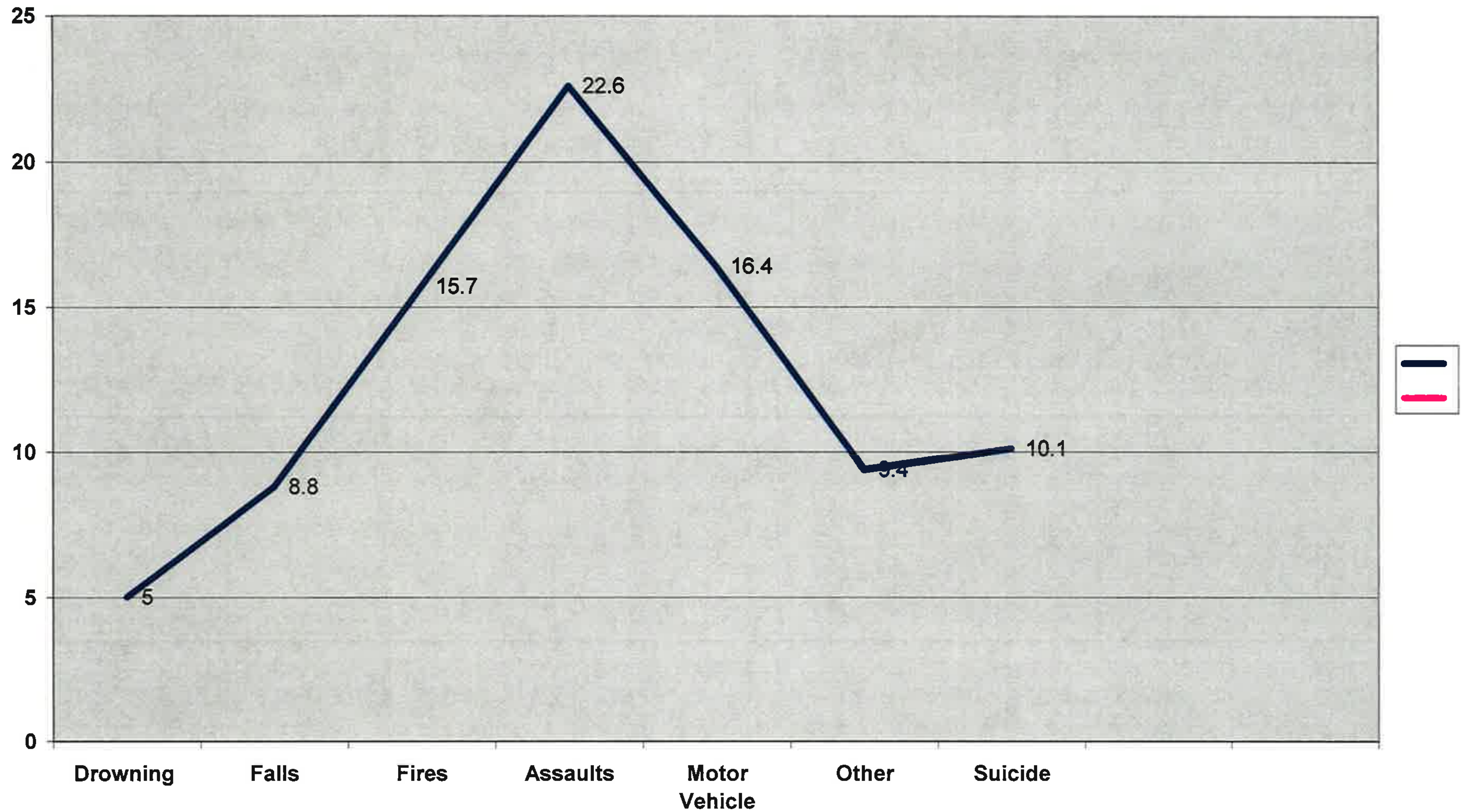


Percent of Fall Injuries by Gender
Your Service Unit for 2005

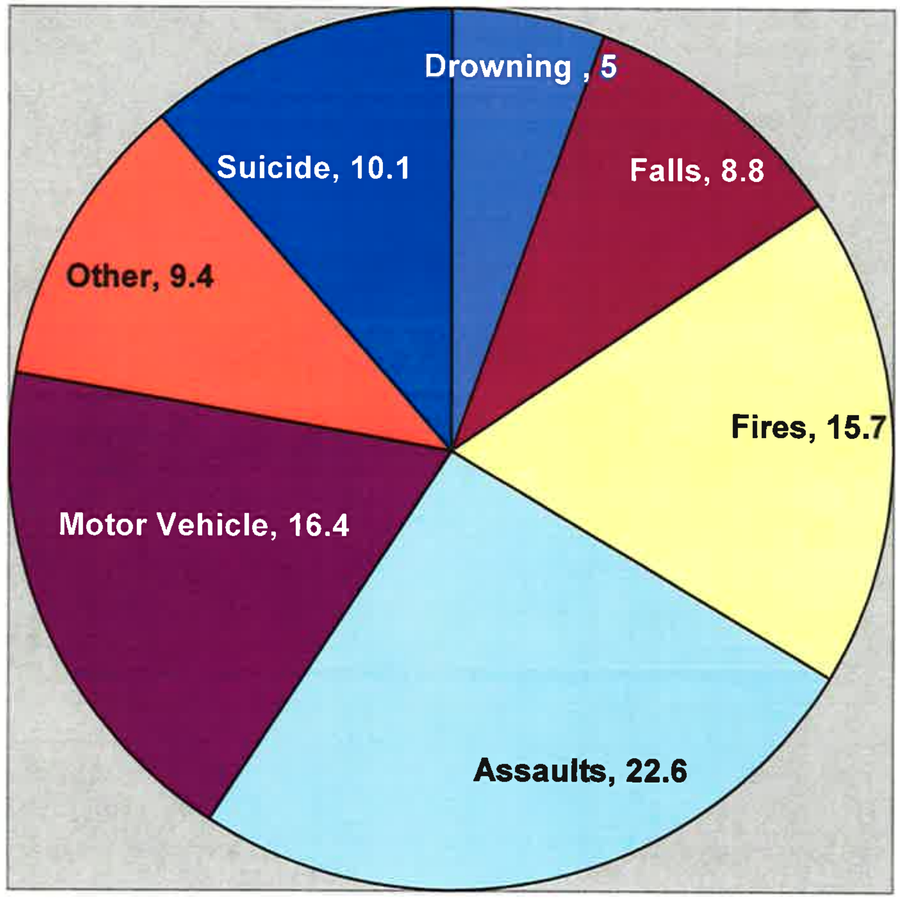


	Male	Female
0 – 4 yrs	5	9.2
5 -9 yrs	8.8	9.2
10 – 14 yrs	15.7	7.4
15 – 24 yrs	22.6	8
25 – 34 yrs	16.4	14.7
35 – 44 yrs	9.4	12.9
45 - 54 yrs	10.1	9.8
55 – 64 yrs	5	14.1
65 yrs plus	6.9	14.7

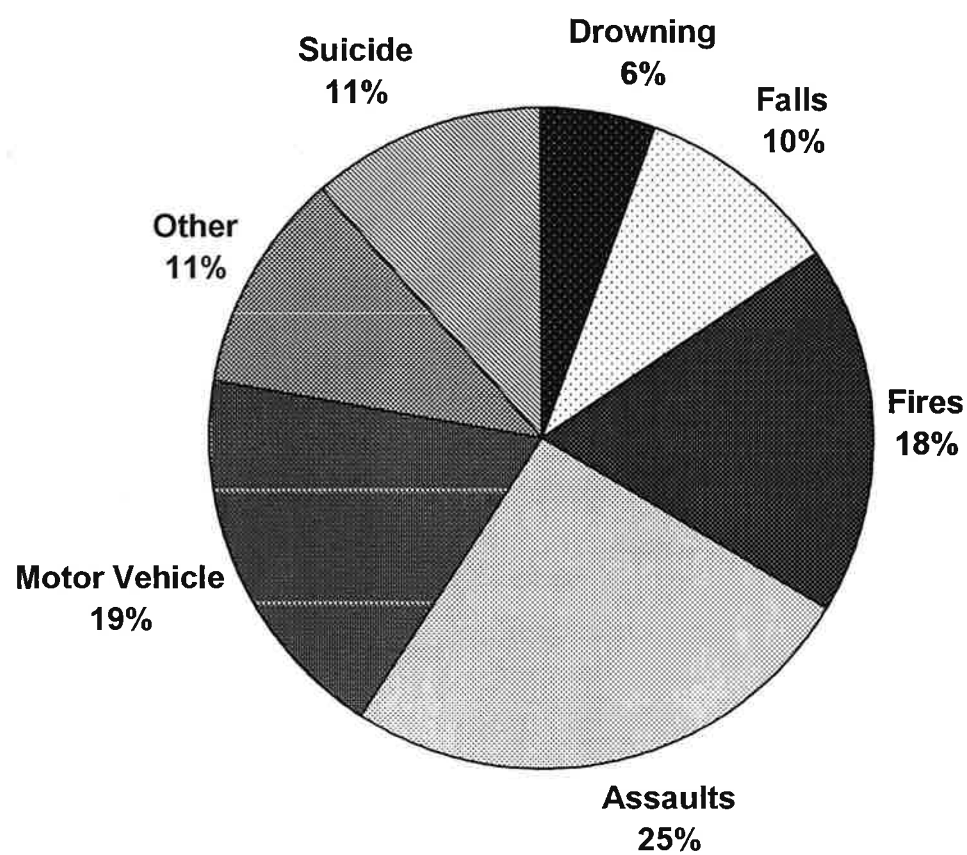
Percent oFall Injuries by Gender
Your Service Unit for 2005



Percent of Injuries by Cause
2005



Percent of Injuries by Cause
2005



Drowning	5
Falls	8.8
Fires	15.7
Assaults	22.6
Motor Vehicle	16.4
Other	9.4
Suicide	10.1

Use the Haddon Matrix to Identify Possible Interventions for Unintentional Injuries

Haddon Matrix to Identify Strategies to Prevent Childhood Injuries Caused by Dog Bites

	Host (Human)	Agent (Dog)	Physical Environment	Social Environment
Pre-Event	Teach kids about dogs: Don't go near a dog's food, unknown dogs, dogs in yards, mother dog with new puppies, etc. Teach children, parents, and caregivers how to respond in case of aggression	Teach dogs appropriate and acceptable behavior (socialization training) Spay and neuter dogs	Maintain dogs in fenced yards or enclosures or by electronic "invisible" means Use gate alarms to indicate when gate is opened	Increase community awareness of the problem and solutions Pass leash laws Pass of dangerous dog laws/ordinances (e.g., requiring impoundment, evaluation, and destruction, if necessary) Initiate and support animal control programs (i.e., evaluate reports of dangerous dogs and pick up strays/unleashed dogs) Establish spay/neuter and vaccination programs
Event	Don't run from dogs Stand still and yell for help Position bike, bag, or other obstacle between you and the dog. If knocked to the ground, protect head, neck and face	Identify risk situations before biting occurs (e.g., watch for signs of aggression like growling, hair raised, etc.) Muzzle dangerous dogs	Respond to alarm system sounding indicating gate is opened or dog has escaped	Apply consequences of dangerous dog laws/ordinances Enforce laws requiring impoundment of dangerous dogs
Post-Event	Provide first aid/trauma care and rabies vaccine if appropriate Provide psychological support if it is necessary	Evaluate dangerous dogs and destroy them if appropriate Impound dogs; observe for rabies	Use emergency medical service (EMS) systems, medical care system, and rehabilitation programs	Maintain community surveillance for dog bites Report dog bite incidents Repeat dog bite prevention messages

Adapted from: (a) AVMA Task Force on Canine Aggression and Human-Canine Interactions. A community approach to dog bite prevention. JAVMA 2001; 218:1732-1749. (b) Wallace LJD. National Center for Injury Prevention and Control (NCIPC), CDC [Personal communication] 2005.

Use the Ecological Model to Organize Possible Interventions to Prevent Violence-Related Injuries

Example:

During the course of a person's life, behavior patterns may change—including those associated with violence. Adolescence and young adulthood are periods when violence and other types of risky behaviors are often more expressive. Understanding these conditions and behaviors can help to identify appropriate interventions and policies. In the following example, the Ecological Model has been used to identify strategies for preventing youth violence.[6]

Table 8. Potential Interventions to Prevent Youth Violence[6]

Level	Potential Interventions
Individual	Programs to increase access to prenatal and postnatal care Preschool enrichment programs Perpetrator programs Victim care and support Building of social skills
Relationship	Home visitation Skill training programs on parenting Supportive relationship with a positive adult role model Home-school partnership programs to promote parental involvement Peer mediation of students helping other students resolve disputes
Community	Extracurricular activities Gang prevention programs Reducing the availability of alcohol
Society	Reducing income inequality Reducing media violence Having laws prohibiting illegal transfers of guns to adolescents Reforming educational system Strengthening and improving police and judicial systems

Use the Decision Matrix to Identify the most appropriate intervention for the Injuries in your region

The Intervention Decision Matrix is a tool designed to help people identify and choose among intervention options. This matrix can also help identify long-term goals and intervention options, which must be considered together. This tool is applied after the priority injury problems have been identified. The original Decision Matrix has seven elements. For the purposes of this manual, the matrix has been adapted to include five elements, to make it more workable. The elements are:

1. Effectiveness,
2. Cost,
3. Sustainability,
4. Social and political acceptability,
5. Possible unintended consequences.

The scoring ranges from 1 for low, 2 for medium, and 3 for high. However, for some elements, the score must be applied in reverse order. Finally, the scores are summed. The strategy with the highest score should be the most viable.

Decision Matrix — Elements and Score

Elements	Score		
1. Effectiveness	**1.** Not proven effective	**2.** Moderately effective	**3.** Highly effective
2. Cost	**1.** High cost	**2.** Medium cost	**3.** Low cost
3. Sustainability	**1.** Low sustainability	**2.** Medium sustainability	**3.** High sustainability
4. Social and political acceptability	**1.** Low acceptability	**2.** Medium acceptability	**3.** High acceptability
5. Possible unintended consequences	**1.** Known consequences	**2.** Unknown or unclear whether there are consequences	**3.** No consequences

Completed Decision Matrix

Elements	Examples
1. Effectiveness Is the intervention useful to preventing injuries? Has it been evaluated?	Child safety seats, when correctly installed and used, reduce the risk of death by 71% for infants and 54% for toddlers aged 1–4 years.
2. Cost Is the proposal affordable? Are there enough resources to develop the proposal? Is the investment justifiable?	Building a special path for pedestrians and bicyclists next to a high-traffic road is an effective strategy to reduce injuries in those groups; however, the cost could be high.
3. Sustainability How long will the intervention be applied after its implementation?	Seat belt laws could have a long-term impact in the reduction of injuries.
4. Social and Political Acceptability What is the current political context in which to develop the prevention strategy? Is the strategy accepted by communities and leaders?	A ban on riding in the back of a truck may not be accepted by the community.